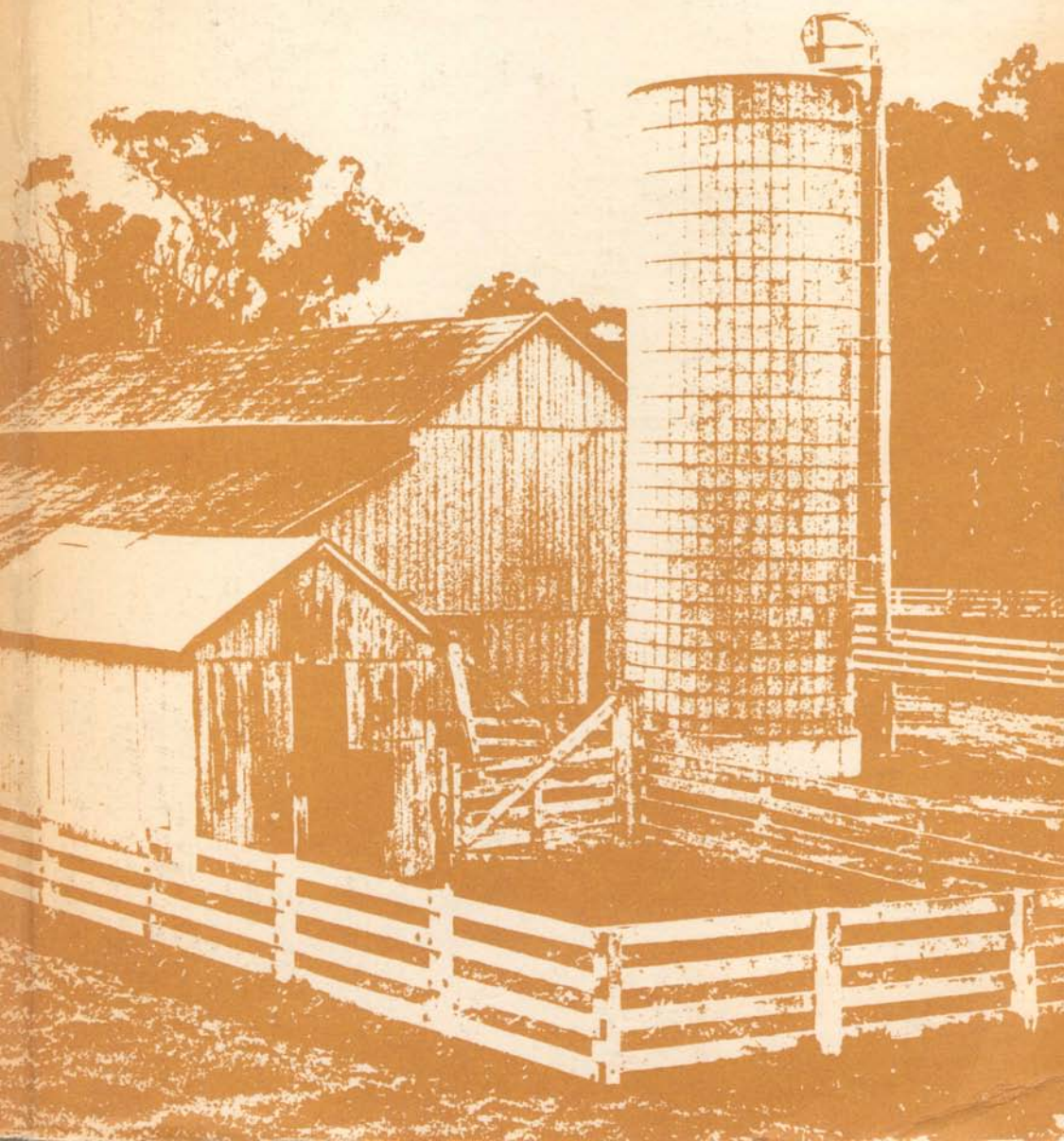


California Polytechnic State University  
San Luis Obispo, California

# Announcements

## 1979-81 Catalog Issue



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# California Polytechnic State University

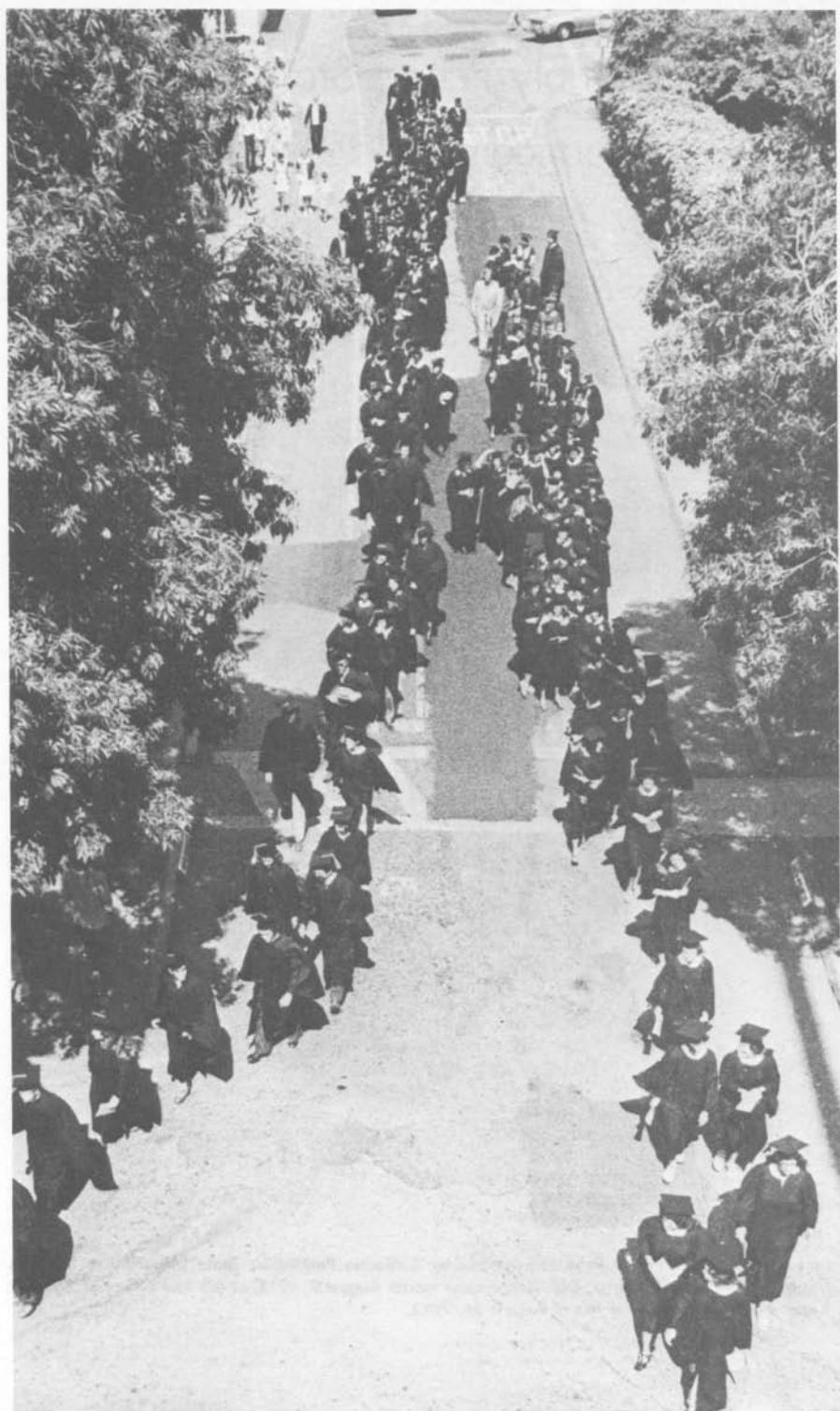
## Announcements 1979-1981

### Catalog Issue

(USPS 084-960)



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# ACADEMIC CALENDAR—1979–1981

## Summer Quarter 1979

Monday	June 18	Beginning of university year Beginning of summer quarter Registration for summer quarter
Tuesday	June 19	Summer quarter classes begin
Tuesday	June 26	Last day to enroll for summer quarter Last day to add courses
Wednesday	July 4	Academic holiday—Independence Day
Tuesday	July 10	Last day to withdraw from classes without petition
Tuesday	August 7	End of seventh week
Friday	August 24	Last day of classes
Monday–Thursday	August 27–30	Final examination period
Thursday	August 30	End of summer quarter
Friday–Sunday	August 31– September 16	Academic holiday

## Fall Quarter 1979

Monday	September 17	Beginning of fall quarter (faculty only)
Thursday	September 20	Registration for new students
Friday	September 21	Registration for continuing and returning students
Monday	September 24	Fall quarter classes begin
Monday	October 1	Last day to enroll for fall quarter Last day to add courses
Friday	October 12	Last day to withdraw from classes without petition
Friday	November 9	End of Seventh Week
Monday	November 12	Academic Holiday—Veteran's Day
Wednesday–Sunday	November 21–25	Academic holiday—Thanksgiving
Wednesday	December 5	Last day of classes
Thurs., Fri., Mon., Tue.	December 6, 7, 10, 11	Final examination period
Tuesday	December 11	End of fall quarter
Wednesday– Wednesday	December 12– January 2	Academic holiday

## Winter Quarter 1980

Thursday	January 3	Beginning of winter quarter
Thursday–Friday	January 3–4	Registration for winter quarter
Monday	January 7	Winter quarter classes begin
Monday	January 14	Last day to enroll for winter quarter Last day to add courses
Friday	January 25	Last day to withdraw from classes without petition
Monday	February 18	Academic holiday—Washington Day
Monday	February 25	End of seventh week
Friday	March 14	Last day of classes
Monday–Thursday	March 17–20	Final examination period
Thursday	March 20	End of winter quarter
Friday–Wednesday	March 21–26	Academic holiday

### Spring Quarter 1980

Thursday	March 27	Beginning of spring quarter
Thursday–Friday	March 27–28	Registration for spring quarter
Monday	March 31	Spring quarter classes begin
Monday	April 7	Last day to enroll for spring quarter
		Last day to add courses
Friday	April 18	Last day to withdraw from classes without petition
Friday	April 25	Last day to apply for June commencement
Friday	May 16	End of seventh week
Monday	May 26	Academic holiday—Memorial Day
Monday	June 9	Last day of classes
Tuesday–Friday	June 10–13	Final examination period
Saturday	June 14	Commencement
		End of spring quarter
		End of university year (faculty only)
Sunday–Tuesday	June 15–17	Academic holiday

### Summer Quarter 1980

Wednesday	June 18	Beginning of university year
		Beginning of summer quarter
		Registration for summer quarter
Thursday	June 19	Summer quarter classes begin
Thursday	June 26	Last day to enroll for summer quarter
		Last day to add courses
Friday	July 4	Academic holiday—Independence Day
Thursday	July 10	Last day to withdraw from classes without petition
Thursday	August 7	End of seventh week
Tuesday	August 26	Last day of classes
Wed., Thurs., Fri., Sat.	August 27, 28, 29, 30	Final examination period
Saturday	August 30	End of summer quarter
Sunday–Sunday	Aug. 31–Sept. 14	Academic holiday

### Fall Quarter 1980

Monday	September 15	Beginning of fall quarter (faculty only)
Thursday	September 18	Registration for new students
Friday	September 19	Registration for continuing and returning students
Monday	September 22	Fall quarter classes begin
Monday	September 29	Last day to enroll for fall quarter
		Last day to add courses
Friday	October 10	Last day to withdraw from classes without petition
Monday	November 10	End of seventh week
Tuesday	November 11	Academic Holiday—Veterans Day
Wednesday–Sunday	November 26–30	Academic holiday—Thanksgiving
Friday	December 5	Last day of classes
Monday–Thursday	December 8, 9, 10, 11	Final examination period
Thursday	December 11	End of fall quarter
Friday–Sunday	December 12– January 4	Academic holiday

### Winter Quarter 1981

Monday	January 5	Beginning of winter quarter
Monday–Tuesday	January 5–6	Registration for winter quarter
Wednesday	January 7	Winter quarter classes begin
Wednesday	January 14	Last day to enroll for winter quarter
		Last day to add courses
Tuesday	January 27	Last day to withdraw from classes without petition
Monday	February 16	Academic holiday—Washington Day
Wednesday	February 25	End of seventh week
Monday	March 16	Last day of classes
Tuesday–Friday	March 17–20	Final examination period
Friday	March 20	End of winter quarter
Saturday–Wednesday	March 21–25	Academic holiday

### Spring Quarter 1981

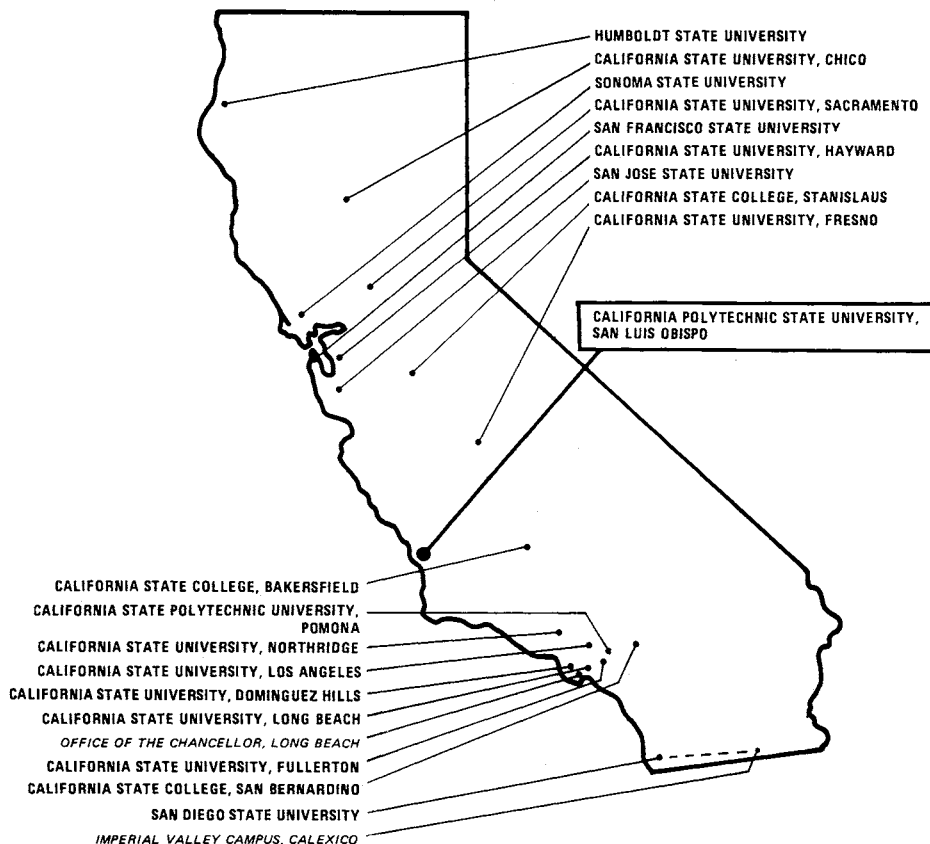
Thursday	March 26	Beginning of spring quarter
Thursday–Friday	March 26–27	Registration for spring quarter
Monday	March 30	Spring quarter classes begin
Monday	April 6	Last day to enroll for spring quarter
		Last day to add courses
Friday	April 17	Last day to withdraw from classes without petition
Friday	April 24	Last day to apply for June commencement
Friday	May 15	End of seventh week
Monday	May 25	Academic holiday—Memorial Day
Monday	June 8	Last day of classes
Tuesday–Friday	June 9–12	Final examination period
Saturday	June 13	Commencement
		End of spring quarter
		End of university year (faculty only)
Sunday–Sunday	June 14–21	Academic holiday

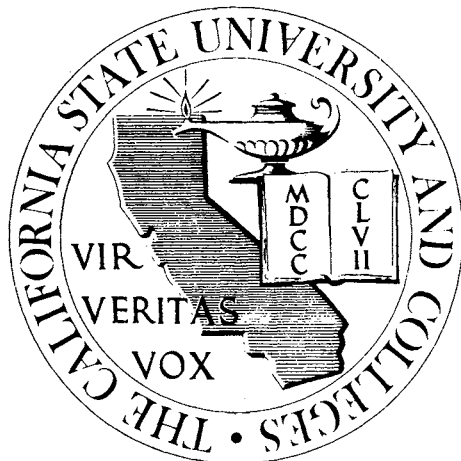
### Summer Quarter 1981 (Tentative)

Monday	June 22	Beginning of university year
		Beginning of summer quarter
		Registration for summer quarter
Tuesday	June 23	Summer quarter classes begin
Tuesday	June 30	Last day to enroll for summer quarter
		Last day to add courses
Monday	July 31	Last day to withdraw from classes without petition
Monday	August 10	End of seventh week
Friday	August 28	Last day of classes
Monday–Thursday	August 31– September 3	Final examination period
Thursday	September 3	End of summer quarter
Friday–Sunday	September 4–20	Academic holiday



## THE CALIFORNIA STATE UNIVERSITY AND COLLEGES





## THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972 the system became The California State University and Colleges. Today, 16 of the 19 campuses have the title "University."

The oldest campus—San Jose State University—was founded in 1857 and became the first institution of public higher education in California. The newest campus—California State College, Bakersfield—began instruction in 1970.

Responsibility for The California State University and Colleges is vested in the Board of Trustees, whose members are appointed by the Governor. The Trustees appoint the Chancellor, who is the chief executive officer of the system, and the Presidents, who are the chief executive officers on the respective campuses.

The Trustees, the Chancellor and the Presidents develop systemwide policy, with actual implementation at the campus level taking place through broadly based consultative procedures. The Academic Senate of The California State University and Colleges, made up of elected representatives of the faculty from each campus, recommends academic policy to the Board of Trustees through the Chancellor.

Academic excellence has been achieved by The California State University and Colleges through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions, offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All of the campuses require for graduation a basic program of "General Education—Breadth Requirements" regardless of the type of bachelor's degree or major field selected by the student. A limited number of doctoral degrees are offered jointly with the University of California and with private universities in California.

Presently, under the system's "New Approach to Higher Education," the campuses are implementing a wide variety of innovative programs to meet the changing needs of students and society. Among pilot programs under way are instructional television projects, self-paced learning plans, minicourses, and credit-by-examination alternatives. *The Consortium of The California State University and Colleges* fosters and sponsors local, regional, and statewide external degree and certificate programs to meet the needs of individuals who find it difficult or impossible to attend classes on a campus.

Enrollments in fall 1978 totaled over 300,000 students, who were taught by a faculty of 17,500. Last year the system awarded over 53 percent of the bachelor's degrees and 33 percent of the master's degrees granted in California. Almost 700,000 persons have been graduated from the 19 campuses since 1960.

## Average Annual Costs and Sources of Funds Per Full-Time Equivalent Student

The 19 campuses and the Chancellor's Office of The California State University and Colleges are financed primarily through funding provided by the taxpayers of California. Including capital outlay, the CSUC 1978/79 budget totals \$840 million. Approximately \$815 million of the \$840 million total has been budgeted to provide support for a projected 237,080 full-time equivalent (FTE\*) students. Excluding capital outlay, the average cost per FTE student is \$3,441 per year. Of this amount, the average student pays \$312. Included in this average student payment calculation is the amount paid by non-resident students. The remaining \$3,129 in costs is funded by state and federal taxes.

Averages do not fit all students alike or even any specific student. To arrive at an average figure that is meaningful, the costs outlined above exclude "user fees" for living expenses, housing, and parking as well as costs for extension and summer session work. Computations are based on full-time equivalent students, not individuals, and costs are prorated by system totals, not by campus. The average costs for a full-time equivalent student in the system are depicted in the following chart:

### Total 1978-79 CSUC Budget (Projected Enrollment: 237,080 FTE)

Funding Source	Amount	Average Cost Per Student (FTE) *	Percentage
State Approp. (Support) .....	\$695,340,533 <sup>(a)</sup>	\$2,933	85.2%
Student Charges.....	73,970,331	312 **	9.1%
Federal (Fin. Aids) .....	46,458,850	196	5.7%
State Funding (Capital Outlay) .....	23,873,000	***	***
Total .....	<u>\$839,642,714</u>	<u>\$3,441</u>	<u>100.0%</u>

<sup>(a)</sup> This amount will be reduced by the CSUC share of the statewide budget reductions required by Budget Act Section 27.1 (a statewide reduction of \$42,400,000 in Operating Expense and Equipment) and Section 27.2 (a statewide reduction of \$54,000,000 in personal services pursuant to the hiring freeze).

\* For budgetary purposes, full-time equivalent (FTE) translates total head count into total academic student load. The term assumes that a full-time student in The California State University and Colleges is enrolled for 15 units of academic credit. Some students enroll for more than 15 units; some students enroll for fewer than 15 units.

\*\* The average costs paid by a student include the student services fee, health facilities fee, college union fee, student body fee, and the nonresident tuition. This amount is derived by taking the total of all student fees and dividing by the total full-time equivalent student enrollment. Individual students may pay more or less than \$312 depending on whether they are part-time, full-time, resident or nonresident students.

\*\*\* Not included in the Average Cost Per Student (FTE), and Percentage columns. The estimated replacement cost of all the system's permanent facilities and equipment on the 19 campuses is currently valued at \$2.6 billion, excluding the cost of land.

# TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

## EX OFFICIO TRUSTEES

The Honorable Edmund G. Brown Jr. ....	State Capitol, Sacramento 95814
Governor of California	
The Honorable Mike Curb.....	State Capitol, Sacramento 95814
Lieutenant Governor of California	
The Honorable Leo McCarthy .....	State Capitol, Sacramento 95814
Speaker of the Assembly	
The Honorable Wilson C. Riles .....	721 Capitol Mall, Sacramento 95814
State Superintendent of Public Instruction	
Dr. Glenn S. Dumke .....	400 Golden Shore, Long Beach 90802
Chancellor of The California State University and Colleges	

## APPOINTED TRUSTEES

Appointments are for a term of eight years, except for a student Trustee and alumni Trustee whose terms are for two years. Names are listed in order of appointment to the Board.

Mr. Charles Luckman (1982) .....	9220 Sunset Blvd., Los Angeles 90069
Mr. Donald G. Livingstone .....	Carter Hawley Hale Stores, Inc.
	550 S. Flower St., Los Angeles 90071
Mr. Roy T. Brophy (1980) .....	2160 Royale Rd., Suite 20, Sacramento 95815
Mrs. C. Stewart Ritchie (1980) .....	1064 Creek Dr., Menlo Park 94025
Mr. Frank P. Adams (1981) .....	235 Montgomery St., Suite 1922, San Francisco 94104
Mr. Richard A. Garcia (1979) .....	31293 E. Nine Dr., Laguna Niguel 92677
Mr. Dean S. Leshner (1981) .....	P.O. Box 5166, Walnut Creek 94598
Dr. Claudia H. Hampton (1982) .....	450 N. Grand, Room G353, Los Angeles 90012
Dr. Mary Jean Pew (1983) .....	2021 N. Western Ave., Los Angeles 90027
Mr. Willie J. Stennis (1983) .....	3947 Landmark, Culver City 90230
Dr. Juan Gomez-Quinones (1984) .....	Professor, History Department
	University of California, Los Angeles
	405 Hilgard Ave., Los Angeles 90024
Mr. John F. O'Connell (1980) .....	P.O. Box 3965, San Francisco 94119
Ms. Blanche C. Bersch (1984) .....	10889 Wilshire Blvd., Suite 628, Los Angeles 90024
Mr. Michael R. Peevey (1985) .....	215 Market St., Suite 930, San Francisco 94105
Mr. John F. Crowley (1985) .....	3068 16th St., San Francisco 94103
Ms. Wallace Albertson (1986) .....	1618 Sunset Plaza Dr. Los Angeles 90069
Mr. Eli Broad (1986) .....	10801 National Blvd., Los Angeles 90064
Mr. Kevin Gallagher (1980) .....	CSC, San Bernardino
	5500 State College Parkway, San Bernardino 92407

## OFFICERS OF THE TRUSTEES

Governor Edmund G. Brown Jr.  
President  
Dr. Claudia H. Hampton  
Chair

Mr. Eli Broad  
Vice Chair  
Chancellor Glenn S. Dumke  
Secretary-Treasurer



# OFFICE OF THE CHANCELLOR

The California State University and Colleges  
400 Golden Shore  
Long Beach, California 90802  
(213) 590-5506

Dr. Glenn S. Dumke .....	Chancellor
Mr. Harry Harmon .....	Executive Vice Chancellor
Mr. D. Dale Hanner .....	Vice Chancellor, Business Affairs
Dr. Alex C. Sherriffs .....	Vice Chancellor, Academic Affairs
Dr. Marjorie Downing Wagner .....	Vice Chancellor, Faculty and Staff Affairs
Mr. Mayer Chapman .....	General Counsel

## THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

California State College, Bakersfield .....	Dr. Jacob P. Frankel, President
9001 Stockdale Highway, Bakersfield, California 93309	(805) 833-2011
California State University, Chico .....	
1st & Normal Streets, Chico, California 95929	(916) 895-5011
California State University, Dominguez Hills .....	Dr. Donald R. Gerth, President
Carson, California 90747	(213) 515-3300
California State University, Fresno .....	
Shaw and Cedar Avenues, Fresno, California 93740	(209) 487-9011
California State University, Fullerton .....	Dr. L. Donald Shields, President
Fullerton, California 92634	(714) 870-2011
California State University, Hayward .....	Dr. Ellis E. McCune, President
Hayward, California 94542	(415) 881-3000
Humboldt State University .....	Dr. Alistair W. McCrone, President
Arcata, California 95521	(707) 826-3011
California State University, Long Beach .....	Dr. Stephen Horn, President
1250 Bellflower Boulevard, Long Beach, California 90840	(213) 498-4111
California State University, Los Angeles .....	Dr. John A. Greenlee, President
5151 State University Drive, Los Angeles, California 90032	(213) 224-0111
California State University, Northridge .....	Dr. James W. Cleary, President
18111 Nordhoff Street, Northridge, California 91330	(213) 885-1200
California State Polytechnic University, Pomona .....	Dr. Hugh O. La Bounty, Jr., President
3801 West Temple Avenue, Pomona, California 91768	(714) 598-4592
California State University, Sacramento .....	Dr. W. Lloyd Johns, President
6000 J Street, Sacramento, California 95819	(916) 454-6011
California State College, San Bernardino .....	Dr. John M. Pfau, President
5500 State College Parkway, San Bernardino, California 92407	(714) 887-7201
San Diego State University .....	Dr. Thomas B. Day, President
5300 Campanile Drive, San Diego, California 92182	(714) 286-5000
Imperial Valley Campus	
720 Heber Avenue, Calexico, California 92231	(714) 357-3721
San Francisco State University .....	Dr. Paul F. Romberg, President
1600 Holloway Avenue, San Francisco, California 94132	(415) 469-2141
San Jose State University .....	Dr. Gail Fullerton, President
125 South Seventh Street, San Jose, California 95192	(408) 277-2000
California Polytechnic State University,	
San Luis Obispo .....	Warren J. Baker, President
San Luis Obispo, California 93407	(805) 546-0111
Sonoma State University .....	Dr. Peter Diamandopoulos, President
1801 East Cotati Avenue, Rohnert Park, California 94928	(707) 664-2880
California State College, Stanislaus .....	Dr. A. Walter Olson, President
800 Monte Vista Avenue, Turlock, California 95380	(209) 633-2122

## General Information



## EDUCATION AT CAL POLY

Cal Poly is different. The difference is apparent to visitors who first see the large, diversified campus with well-tended farmlands stretching away from the academic core. But the difference goes beyond its size, appearance, and unique setting.

The California State Legislature has established special goals for California Polytechnic State University, San Luis Obispo. The administration and faculty are dedicated to achieving these goals, and students are attracted to Cal Poly because they want to benefit from the special educational opportunities offered. These opportunities have led to significant, meaningful jobs for thousands of graduates. Historically, Cal Poly's methods of education and dedication to occupationally-centered curricula have created for the University a distinctive role in higher education. Its statewide and national reputation has made it one of the most popular campuses in California. Cal Poly is particularly noted for its special emphasis and excellence in such applied fields as agriculture, architecture, business, engineering, home economics, and science and mathematics, which are integrated with closely-related career-oriented or supporting fields of communicative arts, education, humanities, and social sciences.

Each applicant is required to select an academic major at the time of application, whether seeking to enter directly from high school or to transfer from another college. A concurrent sequence of general education and elective courses assists the student in relating the chosen area of study to other fields of knowledge. Faculty members, who are selected on the basis of academic qualifications, professional experience, and teaching ability, are encouraged to give the highest priority to effective teaching. At Cal Poly a constant interplay between general principles and practical applications characterizes instruction, whether in the laboratory, the classroom, or field study. Departments assist students in obtaining actual experience through individual and group projects, work-study programs, cooperative education, and internships. Such practical educational experiences in the major field prepare the student for specific occupations and professions or for advanced study.

In addition to preparing the student to meet the requirements of specific occupations, Cal Poly is also dedicated to helping each individual to achieve his or her maximum personal development. An extensive cocurricular program helps the student to develop citizenship, leadership, and the skills necessary for constructive and productive life in the community. Student and faculty participation in the development and improvement of both curricular and cocurricular programs characterize Cal Poly's mode of learning.

## HISTORICAL DEVELOPMENT

California Polytechnic State University began with the establishment in 1901 by the State Legislature of a vocational high school at San Luis Obispo. The institution served as a forerunner in vocational education for agriculture and industry in California. In 1921 its Board of Trustees was dissolved and the State Board of Education administered the school until July 1, 1961 when administration passed to the Trustees of The California State University and Colleges.

Cal Poly began offering junior college courses in 1927, and became a two- and three-year institution in 1933. In 1936 a degree transfer program was added, and in 1940 the first bachelor of science degrees were authorized.

The first baccalaureate exercises were held in 1942. Approval to grant the master of arts degree in education was received in 1949, and to grant the master of science degree in 1967.

From 1933 until his retirement in 1966, the late Dr. Julian A. McPhee was chief administrator of Cal Poly. On May 1, 1967 the Trustees of The California State University and Colleges named Dr. Robert E. Kennedy as president of Cal Poly. Dr. Kennedy retired Feb. 1, 1979 and Dr. Dale W. Andrews was named acting President.

Students are enrolled at Cal Poly in over 50 academic programs. Included are men and women students from all California counties.

## THE CAMPUS

The Cal Poly campus consists of over 5,000 acres adjacent to San Luis Obispo, a community of 35,000 located on U.S. Highway 101, midway between San Francisco and Los Angeles, and 12 miles from the beaches and marine facilities of California's Central Coast.

Due to the varied nature of Cal Poly's curricula, instructional facilities are diverse and suited to the up-to-date demands of modern technology. In addition to faculty offices, classrooms, and laboratories for instructional use, the campus is served by several specialized facilities, particularly in agriculture, architecture, engineering, and the sciences.

Cal Poly has long been known as a friendly campus which welcomes visitors. Maps suitable for a self-conducted tour are available from the information desk of the Administration Building for interested prospective students and parents and others. Arrangements for group visits to the campus may be made by contacting the Office of Relations with Schools and/or the office of the dean of the respective academic school or division.





## FACILITIES

The outstanding agricultural programs of the University utilize such facilities as the Alan A. Erhart Agriculture building (which includes modern laboratories for animal husbandry, accounting, crops, dairy, farm management, and ornamental horticulture); several Agricultural Engineering shops (including farm mechanics, farm machinery, farm power, hydrology, rural electricity); the Food Processing building (which includes a creamery, meat laboratory, canning and freezing laboratories, and an instructional retail facility); soil science and veterinary science laboratories in the Science building; and an unexcelled complex of agricultural production units which are utilized instructionally in Cal Poly's student enterprise projects.

These agricultural units include a beef unit with feeding barns; 3800 acres of cattle range and pasture; a judging pavilion; a complete feed mill with storage facilities; a crops unit which includes washing, crating, and packing areas; and 750 acres of vegetable and field crops plus 30 acres of fruit and vine crops. Dairy unit includes a milking barn, feed barns, judging pavilion, and a complete creamery. In addition, a student project unit provides for 80 head of student owned dairy project cattle. The horse unit includes barns, paddocks, and pasture for thoroughbred and quarter horses. A recently completed ornamental horticulture unit provides the most modern propagation and instructional facilities of their kind in the nation. Additional agricultural units are utilized instructionally for sheep, swine, and poultry production. A new beef cattle evaluation center built through support of private industry and individuals offers operating programs for the improvement of beef cattle quality.

The instructional philosophy of the University as reflected in the extensive and modern agricultural facilities has also been incorporated in programs of engineering and technology, science, mathematics, graphic communications, physical education, home economics, and other areas in which Cal Poly has developed a reputation for excellence. These include laboratories for all phases of engineering such as aeronautical, electronic, environmental and industrial, mechanical, welding technology, and engineering technology.

The computer science building provides computer capabilities for all instructional programs, particularly those in engineering, science, and mathematics. Two large science buildings provide fully equipped laboratories devoted to instruction in bacteriology, botany, chemistry, entomology, marine biology, microbiology, physics, plant pathology, and zoology. The Clyde P. Fisher Science Hall, which includes additional laboratories and classrooms, was completed in 1978.

Individual drafting and study cubicles in architectural laboratories give a distinctive appearance to new drafting classrooms as well as to some of the campus historical buildings which have been remodeled by the students themselves to provide design facilities in the School of Architecture and Environmental Design. The new 70,000 square foot Architecture and Environmental Design building was occupied winter, 1976. The building provides for classrooms, architectural laboratories, offices, and specialized facilities related to architecture.

Campus facilities include, in addition to a 500-seat theater, a language laboratory, and home economics and child development laboratories. The graphic arts building, which houses the journalism program, student newspaper, and radio station, includes the graphic communications department which ranges from the unique Shakespeare Press Museum to the most modern computer typesetting equipment for printing instruction.

The physical education facilities of the campus are extensive. The physical education building provides wrestling, and gymnastic rooms in addition to the main floor which contains three full-length cross-court basketball courts and seats 4,000 persons for athletic contests. Handball and tennis courts are adjacent to the gymnasium, along with a large playing field area for

intramural sports and physical education classes. Two heated swimming pools are used both for physical education classes and for varsity water polo and swimming. The football stadium has a grandstand and bleachers seating 7,900 persons. There is also a spacious baseball field with permanent seating, and a 9-lane all-weather quarter-mile track. Crandall Gymnasium is utilized for minor sports as well as for special women's physical education requirements.

The four-story Administration building and Julian A. McPhee University Union serve all campus personnel. The University Union includes Chumash Auditorium, which accommodates over 1300 persons, lounges, meeting rooms, and offices for the Cal Poly Foundation and the Associated Students, Inc.

The program of the Walter F. Dexter Memorial Library is designed to meet the curricular resource needs of students and the instructional and research needs of the faculty. The collections in excess of 1,800,000 cataloged and unclassified items include 540,000 cataloged volumes, approximately 55,000 bound periodicals, 720,000 microforms, and 500,000 unbound documents, pamphlets, and miscellaneous materials. The Library receives regularly 3,700 periodical and 3,100 other serial titles, and it is an official depository for United States Government and California State publications. Bookstacks located throughout the Library are open to all readers, and professionally trained librarians assist students and faculty in the use of the Library's resources. The new Robert E. Kennedy Library, now under construction, and scheduled to open in late 1980, will significantly expand and improve Cal Poly's library facilities.

Cal Poly has the largest on-campus residence hall complex of any of the campuses of The California State University and Colleges. A variety of living arrangements is offered for over 2,750 single students. There are several food service dining facilities including Vista Grande, which offers both cafeteria and table service restaurant modes of dining. Campus housing, intramural facilities, a modern health services center, the convenience of the University Union, and access to the library and laboratories all combine to provide a well-rounded home on campus for a large proportion of Cal Poly students.

## ACCREDITATION

The University is fully approved as a four-year degree-granting institution by the Western Association of Schools and Colleges. In addition the University holds associate membership in the Northwest Association of Schools and Colleges.

The Chemistry Department is fully approved and accredited by the American Chemical Society and students completing the appropriate curriculum are eligible for certification by the Society. The curriculum leading to the Architecture degree in the School of Architecture and Environmental Design is fully accredited by the National Architectural Accrediting Board. Also accredited are the curricula in Construction, Landscape Architecture, and Architectural Engineering.

Eight degree curricula in the School of Engineering and Technology are accredited by the Engineers' Council for Professional Development. They are: Aeronautical Engineering, Electrical Engineering, Electronic Engineering, Environmental Engineering, Industrial Engineering, Mechanical Engineering, Metallurgical Engineering, and Transportation Engineering.

Also accredited are Engineering Technology course options in air conditioning and refrigeration technology, electronic technology, manufacturing processes technology, and mechanical technology.

The program in Industrial Technology is accredited by the National Association of Industrial Technology, and the program in Agricultural Engineering by the Engineers' Council for Professional Development.

The program in Home Economics is accredited by the American Home Economics Association.

In addition the California Commission for Teacher Preparation and Licensing has authorized the University to recommend for a number of teaching credentials, described in the catalog section on "Teacher Preparation Programs."

## THE FOUNDATION

The California Polytechnic State University Foundation is a separate nonprofit corporation whose general purpose is to promote and assist the educational services of the campus. The major objectives of the Foundation are:

To provide the fiscal means and management procedures that enable the university to carry on activities providing those instructional and service aids not normally furnished by the State.

To provide effective operation and to eliminate undue difficulties which could otherwise arise, due to budgetary, purchasing, and other fiscal limitations.

To provide fiscal procedures and management systems that foster effective coordination of the auxiliary activities with the university in accordance with sound business practices.

Important services provided to the university community include El Corral Bookstore and campus Food Services. In addition, the Foundation provides the basic financial, management, and business support services for University Graphics System; Communications/Media/Productions; sponsored research, grant, and workshop projects; and serves a trustee for gifts designated for the university and its various educational programs.

The California Polytechnic State University Foundation aids students financially by sponsoring student enterprise projects and by employing students. By loaning operating capital for faculty-supervised and educationally-significant projects, the Foundation aids students by helping them to combine learning and earning.

A Board of Directors comprised of university faculty and administrative personnel oversees the operation of the Foundation which is administered by a management staff. Activities in which the Foundation is engaged must be requested and approved by the university, and each year the operations are subject to an independent audit and review by the Office of the Chancellor.

The Foundation Board holds monthly meetings which are open to the public and are regularly attended by representatives of faculty, staff, and student organizations of the university.

## THE ALUMNI ASSOCIATION

The Cal Poly Alumni Association serves all of the more than 100,000 students who have attended California Polytechnic State University, San Luis Obispo, since 1901.

The Association endeavors to maintain communication with former students and coordinates alumni gatherings for educational purposes, reunions and other functions at the campus and in areas throughout California and the United States, and the world.

An international president and two vice-presidents, elected for two-year terms, aided by the secretary-treasurer and the campus coordinator, alumni services, provide leadership for the organization which functions in California through directors in 17 sections of the State. A recent addition to the Association's program, is the establishment of local alumni clubs throughout California. These clubs participate in a wide variety of activities, including sports nights, dinners, and others. The Association also offers its members participation in travel programs, insurance plans, and other special programs.

The Association membership includes 8,000 life and annual members.

The Association currently assists in the production of the quarterly University alumni-oriented publication, *CAL POLY TODAY*, organizes off-campus seminars, supports alumni activities at Homecoming and Poly Royal, and assists in the sponsorship of several special events for students on campus including Week of Welcome (for freshmen and transfer students) and Senior Week. Through contributions to loan and scholarship funds, it provides assistance to current students.

Memberships in several categories for alumni, students, faculty and staff and friends of the University are available through the Alumni Services Office on campus.

## UNIVERSITY ADVANCEMENT

The advancement program at Cal Poly is a unified approach to development of sources of non-State funding from individual donors, corporations, foundations, and other sources. The overall objective of the advancement program is most effectively to present the total needs of the university to its multiple audiences. Advancement program goals include development of a strong alumni association, coordination of non-State funding for research and development, and the raising of non-State funds in support of the university. Planned giving programs include estate planning and deferred giving. The annual giving program of the university includes solicitation of former students, parents, friends of the university, corporations, and foundations. Membership in special gift groups is based on the donor's annual contributions.



## Admissions and Registration



# ADMISSIONS PROCEDURES AND POLICIES

Requirements for admission to California Polytechnic State University, San Luis Obispo are in accordance with Title 5, Chapter 1, Subchapter 3, of the *California Administrative Code*. Prospective applicants who are unsure of their status under these requirements are encouraged to consult a high school or community college counselor or the admissions office. Applications may be obtained from the admissions office at any of the campuses of The California State University and Colleges or at any California high school or community college.

## UNDERGRADUATE APPLICATION PROCEDURES

Prospective undergraduates, whether applying for part-time or full-time programs of study, in day or evening classes, must file a complete application including all the required forms and fees as described in the application booklet. The \$20 nonrefundable application fee should be in the form of a check or money order payable to The California State University and Colleges. Undergraduate applicants should file only at their first choice campus. An alternative choice campus and major may be indicated on the application, but *applicants should list as alternative campus only that campus of The California State University and Colleges that they will attend if the first choice campus cannot accommodate them*. Generally, an alternative degree major will be considered at the first choice campus before an application is redirected to an alternative choice campus. Applicants will be considered automatically at the alternative choice campus if the first choice campus cannot accommodate them. *Transcripts and other supporting documents should not be submitted until requested by the campus.*

## LOCALLY AND SYSTEMWIDE IMPACTED PROGRAMS

Impacted programs are those in which applications received in the first month of the filing period exceed the total spaces available, either locally (at an individual campus) or systemwide. You must make application for an impacted program during the first month of the filing period and may file an application and fee to more than one campus. Nonresidents, foreign or domestic, usually are not considered for admission to impacted programs.

High school and community college counselors are advised prior to the opening of the fall filing period which programs will be impacted. Supplementary admission criteria are used by the campuses to determine which applicants will be allocated space in impacted programs.

### Locally Impacted Programs

In selecting first-time freshmen and lower division transfers with fewer than 12 transferable semester units, at least one-half of the available space will be reserved for the most highly qualified applicants based on previous academic performance as measured by the eligibility index. High school grade point averages based on grades earned in the final three years of high school exclusive of physical education and military science, as reported by applicants on the application, and test scores received by the campus no later than the end of the first month of the filing period will be used to compute the eligibility index. You should take the ACT or SAT test at the earliest date, although the inability of fall applicants to supply test scores by December, will not jeopardize admission priority. Remaining space may be allocated on the basis of self-declared grade point average or other criteria, details of which will be given applicants by the campuses. Applicants who cannot be accommodated will be considered at the same campus in an alternative major or redirected to an alternative campus where the program is not impacted.

### Systemwide Impacted Programs

The supplementary admission criteria used by the individual campuses to screen applicants to systemwide impacted programs appear periodically in the *Counselors' Digest* and are sent to all applicants under consideration. Unlike unaccommodated applicants to locally impacted programs who may be redirected to another campus in the same major, unaccommodated applicants to systemwide impacted programs may not be redirected in the same major but may choose an alternative major either at the first choice campus or another campus.

## POSTBACCALAUREATE APPLICATION PROCEDURES

All applicants for any type of postbaccalaureate status (e.g., master's degree applicants, those seeking credentials, and those interested in taking courses for personal or professional growth) must file a complete application within the appropriate filing period. *Second baccalaureate degree candidates should apply as undergraduate degree applicants and need not complete form B.* A complete application for postbaccalaureate status includes all of the materials required for undergraduate applicants plus the supplementary graduate admissions application. Postbaccalaureate applicants who completed undergraduate degree requirements and graduate the preceding term are also required to complete and submit an application and the \$20 nonrefundable application fee. Since applicants for postbaccalaureate programs may be limited to the choice of a single campus on each application, redirection to alternative campuses or later changes of campus choice will be minimal. In the event that a postbaccalaureate applicant wishes to be assured of initial consideration by more than one campus, it will be necessary to submit a separate application (including fee) to each. Applications may be obtained from the Graduate Studies Office of any California State University or College campus in addition to the sources noted for undergraduate applicants.

### APPLICATION FILING PERIODS

<i>Term</i>	<i>Initial Filing Period</i>	<i>Extended Filing Period</i>
Summer	the previous February	March until filled
Fall	the previous November	December until filled
Winter	the previous June	July until filled
Spring	the previous August	September until filled

### SPACE RESERVATION NOTICES

Most applicants will receive some form of space reservation notice from their first choice campus within two months of filing the application. A notice that space has been reserved is also a request for records necessary to make the final admission decision. It is an assurance of admission *only* if evaluation of the applicant's previous academic record indicates that admission requirements have been met. Such a notice is not transferable to another term or to another campus.

### HARDSHIP PETITIONS

There are established procedures for consideration of qualified applicants who would be faced with extreme hardship if not admitted. Prospective hardship petitioners should write the Admissions Office regarding specific policies governing hardship admission.

### UNDERGRADUATE ADMISSION REQUIREMENTS

First-time freshman eligibility is governed by an eligibility index. The index is computed using the high school grade point average on all course work completed in the last three years of high school, exclusive of physical education and military science; and the ACT composite, or the SAT total score. A table of grade point averages, with corresponding test scores illustrating how the index is computed, is reproduced on p 22.

Registration forms and test dates for either test may be obtained from school or college counselors, from the address below, or from the campus testing offices. For either test, submit the registration form and fee at least one month prior to the test date.

#### ACT Address

American College Testing Program, Inc.  
Registration Unit, P.O. Box 168  
Iowa City, Iowa 52240

#### SAT Address

College Entrance Examination Board  
Box 592  
Princeton, New Jersey 08540

### First-Time Freshman Applicants (California High School Graduates and Residents)

Applicants who are graduates of a California high school or legal residents for tuition purposes must have an eligibility index which places them among the upper one-third of

California high school graduates. The minimum index is 741 (ACT) or 3072 (SAT). The following table illustrates grade point averages and test scores needed to qualify for admission.

**EXCERPTS FROM ADMISSIONS ELIGIBILITY TABLE FOR CALIFORNIA  
HIGH SCHOOL GRADUATES**

G.P.A. ....	2.00 *	2.20	2.40	2.60	2.80	3.00	3.20 **
A.C.T. Score .....	35	31	27	23	19	15	11
S.A.T. Score.....	1472	1312	1142	992	832	672	512

- \* Below 2.0 not eligible.
- \*\* Above 3.20 eligible with any score.

**First-Time Freshman Applicants (Nonresident)**

The admission requirements for nonresident applicants are higher than those for California residents. Applicants who are neither residents for tuition purposes nor graduates of a California high school must have an eligibility index which places them in the upper one-sixth of California high school graduates. The minimum index for such students is 826 (ACT) or 3402 (SAT).

**Undergraduate Transfer Applicants (Resident and Nonresident)**

Transfer admission eligibility is based on TRANSFERABLE college units attempted, rather than on all college units attempted. California Community College transfers should consult their counselors for information on transferability of courses. Applicants in good standing at the last institution attended may be admitted as undergraduate transfers if they meet either of the following requirements:

1. Eligible for admission in freshman standing (see freshman requirements) with a grade point average of "C" (2.0 on a scale where A = 4.0) or better in all transferable college units attempted.
2. Completed at least 56 transferable semester units or 84 transferable quarter units with a grade point average of "C" (2.0 on a scale where A = 4.0) or better if a California resident; nonresidents must have a grade point average of 2.4 or better.

**INTERNATIONAL (FOREIGN) STUDENTS**

The admission of international (foreign) students is governed by separate requirements. The official transcript of record and other credentials of an applicant for admission from a foreign country must be submitted in official English language translation. All application papers must be submitted to the Admissions Office in accordance with the published filing periods. Inquiries concerning admission should be made early enough to allow sufficient time for the necessary correspondence relative to admission. This will aid the applicant in obtaining the necessary travel documents.

An applicant from a foreign country whose education has not been conducted in the English language may be admitted only after demonstrating a command of the language that will enable the student to profit from instruction in the University. An applicant must take the Test of English as a Foreign Language (TOEFL).

**RETURNING STUDENTS**

Former students who have been absent from the University for two or more quarters must file an application for readmission. If the absence has been for two quarters only, and no other institution has been attended during the absence, no application fee is required. If the absence has been for three quarters or more, or if the student has attended another institution during the absence, the \$20 application fee must accompany the application for readmission. To be given full consideration, applications for readmission should be filed during the appropriate filing period. Summer Quarter is a regular quarter and is counted in determining the length of absence.

## **PLANNED EDUCATIONAL LEAVE**

Under certain approved circumstances, the Planned Educational Leave Program makes it possible for students to leave school temporarily without being subject to regular readmissions procedures.

1. Planned Educational Leave must be for purposes which will contribute to the student's educational objectives.
2. Planned Educational Leave will not be approved when the student plans to enroll at another educational institution or obtain work experience.

A student who has an approved Planned Educational Leave will be considered to be in continuous attendance as a regular student and will not be required to apply for readmission or pay an application fee.

Applications for Planned Educational Leaves and regulations governing such leaves may be obtained from the Admissions Office.

## **HIGH SCHOOL STUDENTS**

Students still enrolled in high school will be considered for enrollment in certain special programs if recommended by the principal and if preparation is equivalent to that required of eligible California high school graduates. Such admission is only for a given program and does not constitute the right to continued enrollment. Prospective applicants should contact the Admissions Office.

## **CAREER PLACEMENT INFORMATION**

The campus may furnish, upon request, information concerning the subsequent employment of students who graduate from programs or courses of study which have the purpose of preparing students for a particular career field. This information includes data concerning average starting salary and the percentage of previously enrolled students who obtained employment. The information provided may include data collected from either graduates of the campus or graduates of all campuses in The California State University and Colleges. Interested prospective students may request copies of the published information from the Relations with Schools office.

## **ADMISSION OF POSTBACCALAUREATE AND GRADUATE STUDENTS**

### **Postbaccalaureate Standing—Unclassified.**

For admission to unclassified postbaccalaureate standing, a student must: (a) hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association or have completed equivalent academic preparation as determined by an appropriate campus authority; (b) have attained a grade point of at least 2.5 (on a five-point scale) in the last 60 semester (90 quarter) units attempted; and, (c) have been in good standing at the last college attended. Admission to a California State University or College with postbaccalaureate unclassified standing does not constitute admission to graduate degree curricula.

### **Postbaccalaureate Standing—Classified.**

A student who is eligible for admission to a California State University or College in unclassified standing may be admitted to classified postbaccalaureate standing for the purpose of enrolling in a particular postbaccalaureate credential or certificate program, provided that such additional professional, personal, scholastic, and other standards, including qualifying examinations, as may be prescribed for the particular program by the appropriate campus authority, are satisfied.

### **Graduate Standing—Conditionally Classified.**

A student eligible for admission to a California State University or College under unclassified postbaccalaureate standard above, but who has deficiencies in prerequisite preparation which in the opinion of the appropriate campus authority can be met by specified additional

preparation, including qualifying examinations, may be admitted to an authorized graduate degree curriculum with conditionally classified graduate standing.

### Graduate Standing—Classified.

A student eligible for admission to a California State University or College in unclassified or conditionally classified standing may be admitted to an authorized graduate degree curriculum of the campus as a classified graduate student if he or she satisfactorily meets the professional, personal, scholastic, or other standards for admission to the graduate degree curriculum including qualifying examinations, as the appropriate campus authority may prescribe. Only those applicants who show promise of success and fitness will be admitted to graduate degree curricula, and only those who continue to demonstrate a satisfactory level of scholastic competence and fitness shall be eligible to proceed to such curricula.

## ENGLISH PLACEMENT TEST AND GRADUATION REQUIREMENTS

All students subject to degree requirements of 1977–78 and subsequent general catalogs must demonstrate competency in writing skills as a requirement for graduation. In addition, all lower division students (those who enter with fewer than 56 transferable semester units) are required to take the CSUC English Placement Test (EPT) so that information can be available to help in the selection of appropriate course work in writing skills and to prepare for meeting the graduation requirement. Failure to take the English Placement Test at the earliest opportunity for admission may lead to administrative probation which, according to Section 41300.1 of Title 5, *California Administrative Code*, and CSUC Executive Order 186, may lead to disqualification from further attendance. *The results of the EPT will not affect admissions eligibility.*

Information bulletins and registration materials for the EPT will be mailed to all students subject to these requirements. Alternatively, the materials may be obtained from the Office of Admissions and Records. Information on currently available ways to meet the EPT or the graduation requirement may be obtained from the Admissions Office.

## ADVANCED PLACEMENT

The University offers credit and advanced placement for those students who achieve scores of 3, 4 or 5, on the College Entrance Board advanced placement examinations. Nine quarter units of lower division credit will be granted for such achievement in each subject examination taken upon request and submission of the examination results to the Director, Admissions, Records and Evaluations.

## CREDIT BY EXAMINATION

A regularly enrolled student may be permitted to obtain credit by examination for courses in subject matter fields in which he is especially qualified through previous education or experience and for which credit has not otherwise been given. A credit by examination request will not be considered for a course in which the student is enrolled, or for which a student has received a failing or NC at Cal Poly, or for which a student has previously unsuccessfully attempted credit by examination. A fee of \$1 per unit is charged for such an examination. It may include written, oral, or skills tests, or a combination of all three types, and will be sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course. The grade received is entered on the student's permanent record. The grade may not be Credit-No Credit. The length of the examination will be consistent with the unit value of the course.

Credit toward partial completion of the general education-breadth requirements will be granted for the completion of specified tests of the general examinations in the College Level Examination Program with an appropriate score, and up to 4 units of elective or course equivalent credit for each subject examination completed with an appropriate score. The maximum number of units of credit the University will grant for the successful completion of any combination of general and subject examinations of the College Level Examination Program will be 45 quarter units.

Credit for CLEP and other externally developed examinations will *not* be awarded if any of the following apply: (1) Examination previously taken within the past year; (2) Equivalent

degree credit or duplicate credit has already been granted; (3) Credit has been granted for previous course work or for a previously completed more advanced or higher level examination; (4) Total amount of credit awarded for externally developed tests exceeds 45 quarter units (Advanced Placement Examination credit excluded from this limit).

Arrangements to obtain course credit by examination may be made with the head of the department in which the course is taught. Units of credit received through this procedure may not apply toward the residence requirements for any of the degrees or credentials offered by the University.

Detailed instructions for applying for credit by examination may be obtained from the Records Office.

### CREDIT FOR MILITARY SERVICE

Nine quarter units of elective credit will be allowed toward graduation to any student with honorable discharge submitting evidence of satisfactory completion of one year of training in the military service of the United States. Additional credit may be allowed in accordance with the recommendations of the American Council on Education.

Credit is not given for completion of the six-month Reserve Training Programs or four college level General Educational Development Tests. No grade points are assigned in connection with units of credit allowed for military service. The units allowed are not included in scholarship computations.

### AUDITING OF COURSES

An auditor is a student who is attending courses for no credit. The student must be registered with fees paid for the quarter in which the course is to be audited. A student may enroll to audit a course during the first week of instruction and no later than the 1st day to add a course. The deadline to change from audit to credit is the same as the last day to add a course. A student may change from credit to audit no later than the last day to drop a course without penalty.

In cases where class sections must be limited in enrollment, preference will be given to students enrolling for credit. Students may not enroll for audit classes at registration.

The student services fee and non-resident tuition fee are determined on the basis of the total units for which the student is enrolled including courses audited.

### DETERMINATION OF RESIDENCE FOR NONRESIDENT TUITION PURPOSES

New and returning students of The California State University and Colleges are classified for the purpose of determining the residence of each student for nonresident tuition purposes. The Residence Questionnaire and, if necessary, other evidence furnished by the student is used in making these determinations. A student may not register and enroll in classes until his Residence Questionnaire has been received by the Admissions Office.

The following statement of the rules regarding residency determination for nonresident tuition purposes is not a complete discussion of the law, but a summary of the principal rules and their exceptions. The law governing residence determination for tuition purposes by the California State University and Colleges is found in *Education Code* Sections 68000-68090, 90403, 89705-89707.5 and 68122, 68124 and 68121, and in Title 5 of the *California Administrative Code*, Article 4 (commencing with Section 41900) of Subchapter 5 of Chapter 1, Part V. A copy of the statutes and regulations is available for inspection at the campus Admissions Office.

Legal residence may be established by an adult who is physically present in the state while, at the same time, intending to make California his permanent home. Steps must be taken at least one year prior to residence determination date to evidence the intent to make California the permanent home with concurrent relinquishment of the prior legal residence. Some of the relevant indicia of an intention to establish and maintain California residence are registering to vote and voting in elections in California; satisfying resident California state income tax obligations on total income; ownership of residential property or continuous occupancy or letting of an apartment on a lease basis where one's permanent belongings are kept; maintaining active resident memberships in California professional or social organizations; maintaining California vehicle plates and operator's license; maintaining active savings and checking ac-

counts in California banks; maintaining permanent military address and home of record in California if one is in the military service, etc.

The student who is within the state for educational purposes only does not gain the status of resident regardless of the length of his stay in California

In general, the unmarried minor (a person under 18 years of age) derives legal residence from his parents, or, in the case of permanent separation of the parents, from the parent with whom the minor maintains his place of abode. The residence of a minor cannot be charged by act of the minor or that of the minor's guardian, so long as the minor's parents are living.

A man or a woman may establish his or her residence; marriage is not a governing factor.

The general rule is that a student must have been a California resident for at least one year immediately preceding the residence determination date in order to qualify as a "resident student" for tuition purposes. A residence determination date is set for each academic term and is the date from which residence is determined for that term. *The residence determination dates for 1979-80 academic year are:*

*Fall ..... September 20*

*Winter ..... January 5*

*Spring ..... April 1*

*Summer ..... July 1*

If you have any questions respecting the applicable date, the campus Admissions Office can give you the residence determination date for the term for which you are registering.

There are several exceptions from nonresident tuition. Some of the exceptions provide for:

1. Persons below the age of 19 whose parents were residents of California but who left the state while the student, who remained, was still a minor. When the minor reaches age 18, the exception continues for one year to enable the student to qualify as a resident student.
2. Persons below the age of 19 who have been present in California for more than a year before the residence determination date, and entirely self-supporting for the period of time.
3. Persons below the age of 19 who have lived with and been under the continuous direct care and control of an adult, not a parent, for the two years immediately preceding the residence determination date. Such adult must have been a California resident for the most recent year.
4. Dependent children and spouses of persons in active military service stationed in California on the residence determination date. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year. The exception, once attained, is not affected by transfer of the military person directly to a post outside the 50 states and District of Columbia.
5. Military personnel in active service stationed in California on the residence determination date for purposes other than education at state-supported institutions of higher education. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
6. A student who is an adult alien is entitled to residence classification if the student has been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States; provided, however, that the student has had residence in California for more than one year after such admission prior to the residence determination date. A student who is a minor alien shall be entitled to residence classification if both the student and the parent from whom residence is derived have been lawfully admitted to the United States for permanent residence in accordance with all applicable laws of the United States, provided that the parent has had residence in California for more than one year after acquiring such permanent residence prior to the residence determination date of the term for which the student proposes to attend the University.
7. Certain refugees.
8. Certain credentialed, full-time employees of school districts.
9. Full-time State University and Colleges employees and their children and spouses. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
10. Certain exchange students.
11. Children of deceased public law enforcement or fire suppression employees, who are California residents, and who are killed in the course of law enforcement or fire suppression duties.



12. A person in continuous full-time attendance at an institution who had resident classification on May 1, 1973, shall not lose such classification as a result of adoption of the uniform student residency law on which this statement is based, until the attainment of the degree for which currently enrolled.

Any student, following a final decision on campus on residence classification, *only* may make written appeal to:

The California State University and Colleges  
Office of General Counsel  
400 Golden Shore  
Long Beach, California 90802

within 120 calendar days of notification of the final decision on campus of the classification. *The Office of General Counsel may make a decision on the issue, or it may send the matter back to the campus for further review.* Students classified incorrectly as residents or incorrectly granted an exception from nonresident tuition are subject to reclassification as nonresidents and payment of nonresident tuition in arrears. If incorrect classification results from false or concealed facts, the student is subject to discipline pursuant to Section 41301 of Title 5 of the *California Administrative Code*. Resident students who become nonresidents, and nonresident students qualifying for exceptions whose basis for so qualifying changes, must immediately notify the Admissions Office. Applications for a change in classification with respect to a previous term are not accepted.

The student is cautioned that this summation of rules regarding residency determination is by no means a complete explanation of their meaning. The student should also note that changes may have been made in the rate of nonresident tuition, in the statutes, and in the regulations between the time this catalog is published and the relevant residence determination date.

## GRADUATE COURSES TAKEN BY UNDERGRADUATES

Undergraduates are not permitted to take courses in the 300, 400, or 500 series for graduate credit until they are within 12 quarter units of graduation. Such students may petition for up to 9 units of graduate credit when the courses are not required for the baccalaureate and must petition for the credit prior to completion of the course work. Students should verify the applicability of such credit toward their graduate objective.

## REGISTRATION

All students are required to enroll in courses which meet the requirements of their major course of study insofar as these courses are available.

The schedule for registration and payment of fees is published in the "Class Schedule" which is on sale prior to the start of each quarter. Students should consult this booklet for detailed registration procedures.

Credit for coursework completed is given only when the student is properly registered. A student is not properly registered until fees have been paid and quarterly registration materials have been filed with the Registrar's Office. Individuals are not permitted to attend courses unless they are officially registered as regular students, as approved extension students, or as enrolled auditors. See "Academic Policies, Audit."

## FEES AND EXPENSES

### Student Services Fee

A Student Services Fee was established by the Board of Trustees of The California State University and Colleges in January 1975. Previously, this fee was known as the Materials and Services Fee.

The student services fee provides financing for the following student services programs not covered by State funding:

- 1) Social and Cultural Development Activities: provides for the coordination of various student activities, student organizations, student government, and cultural programs.
- 2) Counseling: includes the cost of counselor's salaries and clerical support plus operating expenses and equipment.
- 3) Testing: covers the cost of test officers, psychometrists, clerical support, operating expenses, and equipment.
- 4) Placement: provides career information to students and faculty for academic program planning and employment information to graduates and students.
- 5) Financial Aid Administration: includes the cost of the counseling and business services provided in connection with the financial aid programs.
- 6) Health Services: provides health services to students and covers the cost of salaries of medical officers and nurses plus related clerical and technical personnel as well as operating expenses and equipment.
- 7) Housing: includes the cost of personnel providing student housing information and monitoring housing services.
- 8) Student Services Administration: covers 50 percent of the cost of the Dean of Students Office which has responsibility for the overall administration of student services.

#### Required State Fees for Regularly-Enrolled Resident Students

Application fee (nonrefundable).....	\$20.00
Campus services card fee (each student, per card).....	1.50
Facilities fee (non-State funded, per quarter) .....	2.00
Student services fee (per quarter):	
0-6.0 units.....	Fall and Winter 1979/80—38.00; thereafter—40.00
more than 6 units .....	Fall and Winter 1979/80—48.00; thereafter—50.00

#### Additional State Fees

Transcript of record.....	1.00
Late registration fee.....	5.00
Credit by examination fee (per unit) .....	1.00
Failure to meet administratively required appointment or time limit.....	2.00
Library fees .....	See Schedule in library
Thesis binding fee.....	7.50
Check returned for any cause .....	5.00
Housing (annual license, double occupancy)	
Academic year .....	879.00
Summer quarter .....	293.00
*Parking fees:	
Quarterly, nonreserved spaces .....	10.00
Quarterly pool (2 or more vehicles), each pool .....	12.00
Daily permits .....	0.25
Each alternate vehicle, additional fee .....	2.00
Conference, short course or institute, per person .....	Estimated cost
Extension course fees (per quarter unit):	
Lecture and discussion.....	23.50
Activity .....	28.50
Laboratory .....	44.00
Summer session fee (per quarter unit) .....	25.00
Nonresident tuition—(\$2,100 annual maximum):	
For 15 units or more (per quarter) .....	570.00
For less than 15 units (per quarter per unit or fraction of unit) .....	38.00

- \* Proportionate fees apply during summer session. Less than four-wheel, self-propelled vehicles 25 percent of published fee, exclusive of alternate vehicle fee.

Auxiliary organization fees (subject to change)

Associated students fee (required):

Summer .....	5.00
Fall .....	10.00
Winter and spring quarters, each .....	5.00

University union fee (required):

Summer .....	10.00
Academic year each quarter .....	14.00

Meals (subject to change):

19 meals per week, academic year .....	990.00
14 meals per week, academic year .....	870.00

Health fee (for optional services):

Academic year .....	45.00
Quarterly .....	18.00

Sponsored program fee (per week) .....	10.00
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Note: Fees are subject to change without advance notice.

No fees of any kind shall be required of or collected from those individuals who qualify for such exemption under the provisions of the Alan Pattee Scholarship Act.

### REFUND OF FEES

Details concerning fees which may be refunded, the circumstances under which fees may be refunded, and the appropriate procedure to be followed in seeking a refund may be obtained from the Records Office or the University Cashier.

### DEBTS OWED TO THE UNIVERSITY

Should a student or former student fail to pay a debt owed to the institution, the university may "withhold permission to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise or any combination of the above from any person owing a debt" until the debt is paid (see Title 5, *California Administrative Code*, Sections 42380 and 42381). For example, the institution may withhold such a service as furnishing copies of a student's transcript. If a student believes that he or she does not owe all or part of an unpaid obligation, the student should contact the campus business office. The business office, or another office on campus to which the student may be referred by the business office, will review the pertinent information, including information the student may wish to present, and will advise the student of its conclusions with respect to the debt.

### CREDIT CARDS

In the event a student desires to pay any fees by use of BankAmericard, VISA, or Master Charge, he/she should contact the Business Office. If the student's bank does not have a check service program through the campus, the student may seek a cash advance at a local bank.

# Academic Programs and Policies



# ACADEMIC PROGRAMS

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
<b>School of Agriculture and Natural Resources</b>		
	Agriculture	M.S.
	General Agricultural Sciences	
	International Agriculture	
	Mechanized Agriculture	
	Soil Conservation	
Agricultural Education Department	Agricultural Science	B.S.
	Agricultural Mechanics	
	Agricultural Products and Processing	
	Agricultural Resources Management	
	Agricultural Supplies and Services	
	Animal Production	
	Ornamental Horticulture	
	Plant Production	
Agricultural Engineering Department	Agricultural Engineering	B.S.
	Mechanized Agriculture	B.S.
Agricultural Management Department	Agricultural Management	B.S.
	Agricultural Business Management	
	Farm Management	
Animal Science Department	Animal Science	B.S.
Crop Science Department	Crop Science	B.S.
	Fruit Science	B.S.
Dairy Science Department	Dairy Science	B.S.
	Husbandry	
	Manufacturing	
Food Science Department	Food Science	B.S.
Natural Resources Management Department	Natural Resources Management	B.S.
	Environmental Services	
	Fishery and Wildlife Management	
	Forest Resources Management	
	Parks and Recreation	
Ornamental Horticulture Department	Ornamental Horticulture	B.S.
	Floriculture and Design	
	Landscape Industry	
	Nursery Management	
Poultry Industry Department	Poultry Industry	B.S.
Soil Science Department	Soil Science	B.S.
Veterinary Science Department		
<b>School of Architecture and Environmental Design</b>		
Architectural Engineering Department	Architectural Engineering	B.S.
Architecture Department	Architecture	B.S., M.Arch.
City and Regional Planning Department	City and Regional Planning	B.S., M.C.R.P.

<i>Schools and Department</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
Construction Department	Construction	B.S.
Landscape Architecture Department	Landscape Architecture	B.S.
<b>School of Business</b>		
Accounting Department	Business Administration	M.B.A.
	Business Administration Accounting	B.S.
Business Administration Department	Business Administration Finance and Property Management Marketing Management	B.S.
Economics Department	Economics Business and Industrial Economics International Trade & Development Quantitative Economics	B.S.
Management Department	Business Administration Industrial Relations International Business Management Management Management Information Systems	B.S.
<b>School of Communicative Arts and Humanities</b>		
Art Department	Applied Art and Design Crafts Design Graphic Design	B.S.
English Department	English	B.A., M.A.
Foreign Languages Department		
Graphic Communications Department	Graphic Communications Computer Graphic Communications Design Reproduction Packaging Printing Management	B.S.
History Department	History	B.A.
Journalism Department	Journalism Agricultural Journalism Broadcast Journalism News-Editorial Photojournalism Public Relations-Advertising	B.S.
Music Department		
Philosophy Department		
Speech Communication Department	Speech Communication	B.A.
<b>School of Engineering and Technology</b>		
	Engineering	M.Engr.
	Engineering Science	B.S.
Aeronautical Engineering Department	Aeronautical Engineering	B.S.

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
Civil Engineering Department	Civil Engineering Public Works Transportation	B.S.
Electronic and Electrical Engineering Department	Electrical Engineering	B.S.
Engineering Technology Department	Electronic Engineering Engineering Technology Air Conditioning-Refrigeration Technology Electronic Technology Manufacturing Processes Technology Mechanical Technology Welding Technology	B.S.
Environmental Engineering Department	Environmental Engineering Air Conditioning-Refrigeration Air Pollution Control Solar Environmental Systems Water Pollution-Waste Management	B.S.
Industrial Engineering Department	Industrial Engineering Manufacturing Systems	B.S.
Industrial Technology Department	Industrial Arts Automotives Drafting Electronics Graphic Arts Metals Wood-Plastics Industrial Technology	B.A., M.A.
Mechanical Engineering Department	Mechanical Engineering General Nuclear	B.S.
Metallurgical Engineering Department	Metallurgical Engineering	B.S.
<b>School of Human Development and Education</b>		
Child Development Department	Liberal Studies Child Development Child Development Family Studies	B.A. B.S.
Education Department	Education Administrative Services Counseling and Guidance Curriculum and Instruction Reading Special Interest Option	M.A.
Home Economics Department	Dietetics—Food Administration Home Economics	B.S. B.S., M.S.

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
Physical Education Department	Physical Education Athletic Coaching Health Education Teaching Recreation Administration	B.S., M.S.    B.A.
Psychology Department		
<b>School of Science and Mathematics</b>		
Biological Sciences Department	Biological Sciences Anatomy-Physiology Biology Botany Marine Biology Plant Pathology-Entomology Environmental and Systematic Biology Microbiology Medical Technology Microbiology	B.S., M.S.      B.S. B.S.
Chemistry Department	Biochemistry Chemistry	B.S. B.S., M.S.
Computer Science and Statistics Department	Computer Science Statistics	B.S., M.S. B.S.
Mathematics Department	Mathematics Applied Mathematics Finite Mathematics Mathematics Teaching Mathematics Applied Mathematics Mathematics Teaching	B.S.    M.S.
Military Science Department		
Physics Department	Physical Science Physics	B.S. B.S.
<b>Division of Social Sciences</b>		
Political Science Department	Political Science International Affairs Pre-Law Public Administration Teaching Urban Studies	B.A.
Social Sciences Department	Social Sciences Community Studies Criminal Justice Cross-Cultural Studies Social Sciences Teaching Social Services	B.S.



**ENROLLMENT IN UNDERGRADUATE AND GRADUATE PROGRAMS, AND  
ENROLLMENT OF MEN AND WOMEN STUDENTS, BY SCHOOL AND  
MAJOR, FALL 1978**

Schools and Major Curricula	Under- grad- uate Pro- grams	Grad- uate Pro- grams	Men	Women	Total Enroll- ment
<i>School of Agriculture and Natural Resources</i>					
Agriculture (M.S.) .....	—	100	72	28	100
Agricultural Management .....	772	—	559	213	772
Agricultural Ed/Sci. ....	110	—	59	51	110
Agricultural Engineering.....	114	—	104	10	114
Animal Science .....	591	—	242	349	591
Crop Science .....	237	—	204	33	237
Dairy Science .....	96	—	64	32	96
Food Science .....	153	—	76	77	153
Fruit Science .....	74	—	61	13	74
Mechanized Ag.....	99	—	97	2	99
Natural Resources Mgmt.....	450	—	291	159	450
Ornamental Hort.....	738	—	416	322	738
Poultry Industry.....	41	—	31	10	41
Soil Science .....	172	—	120	52	172
Totals .....	3,647	100	2,396	1,351	3,747
<i>School of Architecture and Environmental Design</i>					
Architecture .....	797	25	687	135	822
Architectural Engineering .....	182	—	157	25	182
City and Regional Planning .....	102	9	88	23	111
Construction .....	132	—	126	6	132
Landscape Arch .....	188	—	138	50	188
Totals .....	1,401	34	1,196	239	1,435
<i>School of Business</i>					
Business Administration.....	1,288	21	749	560	1,309
Economics .....	118	—	74	44	118
Totals .....	1,406	21	823	604	1,427
<i>School of Communicative Arts and Humanities</i>					
Applied Art and Design.....	136	—	42	94	136
English .....	188	22	49	161	210
Graphic Communications .....	371	—	221	150	371
History .....	130	—	77	53	130
Journalism .....	233	—	92	141	233
Speech.....	84	—	27	57	84
Totals .....	1,142	22	508	656	1,164

**ENROLLMENT IN UNDERGRADUATE AND GRADUATE PROGRAMS, AND  
ENROLLMENT OF MEN AND WOMEN STUDENTS, BY SCHOOL AND  
MAJOR, FALL 1978 (Continued)**

Schools and Major Curricula	Under- grad- uate Pro- grams	Grad- uate Pro- grams	Men	Women	Total Enroll- ment
<i>School of Engineering and Technology</i>					
Aeronautical Engineering .....	207	—	196	11	207
Civil Engineering .....	239	—	211	28	239
Electrical Engineering .....	135	—	130	5	135
Electronic Engineering .....	599	—	582	17	599
Engineering (M Engr.) .....	—	29	27	2	29
Engineering Science .....	62	—	49	13	62
Engineering Technology .....	493	—	478	15	493
Environmental Engineering .....	183	—	152	31	183
Industrial Arts .....	145	11	148	8	156
Industrial Engineering .....	155	—	132	23	155
Industrial Technology .....	173	—	163	10	173
Mechanical Engineering .....	633	—	612	21	633
Metallurgical Engineering .....	60	—	58	2	60
Totals .....	3,084	40	2,938	186	3,124
<i>School of Human Development and Education</i>					
Child Development .....	406	—	16	390	406
Dietetics and Food Adm. ....	286	—	13	273	286
Education .....	—	422	133	289	422
Home Economics .....	420	24	3	441	444
Liberal Studies .....	318	—	35	283	318
Physical Education .....	381	25	183	223	406
Recreation Administration .....	157	—	54	103	157
Vocational Education .....	4	—	3	1	4
Totals .....	1,972	471	440	2,003	2,443
<i>School of Science and Mathematics</i>					
Biochemistry .....	143	—	80	63	143
Biological Sciences .....	672	44	335	381	716
Chemistry .....	83	12	68	27	95
Computer Science .....	390	37	312	115	427
Math .....	234	15	148	101	249
Physical Science .....	16	—	9	7	16
Physics .....	48	—	38	10	48
Statistics .....	18	—	8	10	18
Totals .....	1,604	108	998	714	1,712
<i>Division of Social Sciences</i>					
Political Science .....	193	—	111	82	193
Social Science .....	347	—	96	251	347
Totals .....	540	—	207	333	540
Campus Totals .....	14,796	796	9,506	6,086	15,592

# ACADEMIC REQUIREMENTS

Curricula leading to graduation with the degree of bachelor of science or bachelor of arts are offered in agriculture, architecture, engineering, business, and in the applied arts and applied sciences. Occupational majors in these fields are described under the appropriate school or division heading in this catalog. In addition Cal Poly offers the following degrees: master of science, master of arts, master of architecture, master of business administration, master of city and regional planning, master of engineering. It also offers the bachelor of vocational education degree and a technical certificate in selected agricultural fields. Programs leading to teaching credentials authorizing service in the public schools are described under the heading "Teacher Preparation Programs."

## APPLICATION FOR GRADUATION

Students shall file application for graduation in the Records Office prior to the last date for filing such applications, as shown in the academic calendar. Application forms and evaluations for graduation are available in the Evaluations Office. The effective date of graduation will be the end of the quarter when all requirements have been met.

## DOUBLE MAJORS

The student will normally meet graduation requirements for a degree in one of the major curricula.

It is permissible for a student to be granted a bachelor's degree with two majors if the complete requirements of both major curricula have been met at the time the application for graduation is filed.

No more than one diploma or degree will be granted to the same student at one commencement. In the event that a student has completed the requirements for two different degrees, as a BA and a BS, the student will be required to declare one major as the degree major in order to determine which degree will be awarded.

A student who desires to submit only one senior project covering two graduation majors must file a petition for special consideration prior to the date of commencing the senior project.

## SECOND BACHELOR'S DEGREE

A qualified student who holds a bachelor's degree from Cal Poly or from another accredited institution may be awarded a second bachelor's degree in a different major when all requirements have been met and providing a minimum of 36 units of course work have been completed in residence after the requirements for the first degree have been fulfilled. A senior project is required for each bachelor's degree.

## BACHELOR'S DEGREES

### GENERAL REQUIREMENTS FOR GRADUATION

All candidates for a bachelor's degree shall have completed the requirements in one of the listed curricula with a minimum "C" grade average for all units in the major, and shall have earned a total number of grade points at least equal to twice the number of units attempted. For this purpose courses comprising the major are identified on curriculum evaluation sheets available from the Evaluations Office. Transfer students, in their work taken at this University, must earn a number of grade points at least equal to twice the number of units attempted. All candidates for these degrees shall have earned not less than 50 quarter units in residence, and shall have earned at least 30 of these units among the last 40 units counted toward the degree. (Extension credit or credit by examination may not be used to fulfill the residence requirement.)

Candidates for the bachelor of science degree (except in engineering) must present from 186 to 198 units for graduation according to the approved curriculum for each major. Candidates in engineering must present at least 200 units (210 units in Architectural Engineering). Candidates for the bachelor of arts degree must present 186 units for graduation according to the approved curriculum for each major. Exemption from required courses by waiver, substitution, or examination does not reduce the total required units for each degree.

The Board of Trustees has approved a resolution requiring a demonstration of writing skills competency as a requirement for graduation. Students will be advised when further information is available on methods for meeting this requirement.

## GENERAL EDUCATION BREADTH REQUIREMENT

All candidates for the bachelor's degree must complete a minimum of 60 quarter units of general education as specified below. The curriculum for each major published in this catalog is designed to satisfy the general education breadth requirement. The requirement is met in different ways depending on the particular major. The student planning to transfer from another college should therefore consult the published curriculum for the major and plan course work accordingly.

No course shall be used for this purpose if it has a prerequisite unless such prerequisite is also counted as general education. Only degree credit courses in the 100, 200, and 300 series may be counted as general education. No more than six units in the major academic discipline of the student may be counted as fulfilling the general education requirement.

### Natural Sciences

At least 15 units chosen from courses in the natural sciences, with at least one course in life science (Bact, Bio, Bot, Cons, Ent, Zoo), and at least one course in physical science (Astr, Chem, Geol, PSc, Phys). Up to six units of "broadly-based" course work in the Schools of Agriculture and Natural Resources, (Ag. 301 only), or Engineering and Technology (Engr 301 only), may be counted in this category, provided that these units are taken outside the School in which the student is enrolled. No more than three courses having the same prefix may be counted to satisfy the natural science requirement. Maximum 24 units.

### Social Sciences

At least 9 units chosen from courses in Ant, Econ, Geog, PolSc, Psy, Soc Sc, Soc. All students must take PolSc 201.<sup>1</sup> No more than two courses having the same prefix may be counted in this category. Maximum 16 units.

### Humanities

At least 15 units chosen from courses in Art, Th, Hist, Hum, literature (in English or in a foreign language), Mu, Phil, Sp.<sup>3</sup> All students must include two courses in literature or two courses in philosophy or one of each. All students must take Hist 204 and 205,<sup>1</sup> or equivalent. No more than 4 units each in Art, Th, Mu, nor 6 units in Hist, may be counted in this category. Maximum 21 units.

### Basic Subjects

Mathematical Sciences (CSc, Math, Stat) (at least a 3-unit course), written communication (Engl) (one course), oral (Sp) or written communication (at least one course). Additional units to complete the minimum of 12 to maximum of 16 units may be elected from foreign languages or from any of the preceding three areas.

### Other Subjects

Physical Education Activity or Health Education (3 to 5 units, at the option of individual Schools).<sup>2</sup> Any 6 to 4 units (depending upon P.E. requirements of individual Schools), provided that these additional units are taken outside the department in which the student is enrolled. Minimum 3 units, maximum 9 units.

<sup>1</sup> These courses are required to satisfy Section 40404 of the Administrative Code, but the units may also be counted as general education (Section 40405). Transfer students, certified as having completed the general education requirement, will have to complete this requirement separately if they have not already done so. (Social sciences and history majors will take an equivalent sequence.)

<sup>2</sup> Exemption from the course in Health Education may be granted by the Director of Admissions, Records and Evaluations upon receipt of a statement of contrary religious belief. Exemption from required Physical Education Activity may be authorized by the Director of Admissions, Records and Evaluations based on recommendation of medical authority, or attainment of age 18 at the time of initial enrollment. Any veteran may claim appropriate military service as a substitute for the physical education requirements.

<sup>3</sup> Speech courses meeting the Humanities requirement include: Sp 317 and 318.

## MASTER'S DEGREES

Cal Poly offers graduate programs leading to the master's degree in several areas. Curricula for the master's degrees are briefly outlined in the appropriate departmental sections of this catalog. For complete requirements for graduate study and for the master's degrees consult the *Graduate Studies Announcement*.

## TEACHER PREPARATION PROGRAMS

California Polytechnic State University is authorized by the California Commission for Teacher Preparation and Licensing to prepare candidates and recommend for the following credentials:

- Multiple Subject Instruction (as commonly practiced in California elementary schools)
- Single Subject Instruction (as commonly practiced in California high schools and most junior high schools)
- Administrative Services
- Pupil Personnel Services
- Reading Specialist
- Special Education (Learning handicapped) Specialist

Further information, requirements, and procedures for entering a particular credential program may be obtained from Education Department Credentials Office and the appropriate credential program coordinator. A bulletin, *Teaching Credential Requirements for Single Subject and Multiple Subject Instruction*, is available upon request from the Education Department.

Approved University degree majors which have received examination waiver status for a teaching credential are for Multiple Subject Instruction: Liberal Studies; and for Single Subject Instruction: Agriculture (12 majors), Agriculture Science, Biological Sciences, English, History, Home Economics, Industrial Arts, Mathematics, Physical Education, Physical Sciences, Political Science, Social Sciences.

## TWO-YEAR TECHNICAL CURRICULA IN AGRICULTURE

All candidates for a technical certificate shall have completed 98 quarter units of courses approved by the department granting the certificate, shall have been in residence at least two quarters immediately preceding graduation, shall have earned not less than 32 quarter units in residence, and shall have earned a total number of grade points at least equal to twice the number of units attempted.

## SPECIAL INSTRUCTIONAL SERVICES

### INSERVICE TRAINING IN AGRICULTURE

Cal Poly plays an active role in the inservice training of teachers of vocational agriculture by providing instructional staff and facilities for workshops and training programs cooperatively sponsored by the University and the State of California.

The campus provides an annual summer skills program. The content varies, depending upon the needs and desires of the teachers as these are expressed through the California Agricultural Teachers Association. University faculty members provide up-to-date training in the technical phases of agriculture and also contribute to the professional improvement of teachers by offering instruction in teaching methods.

The annual summer conference of the California Agricultural Teachers Association is held at the campus with an attendance of over 300 persons. Facilities, special speakers, exhibits, and other services are provided.

## SERVICES TO VOCATIONAL AGRICULTURE

Services to vocational agriculture departments in the secondary schools of California are provided by the campus staff through such activities as: visiting vocational agriculture departments to discuss with teachers and students dairy, animal husbandry, deciduous and citrus fruits, field and truck crops, poultry, farm mechanics, farm management, and other problems; writing for agricultural magazines; assisting high school vocational agriculture departments to solve educational and agricultural problems through correspondence; judging of livestock, poultry, crops and other products at fairs; furnishing of breeding stock and hatching eggs to improve herds and flocks owned by Future Farmers throughout the State; and preparing a variety of teaching aids. These services are provided through a cooperative arrangement with the State of California.

Other services to vocational agriculture are rendered by the Instructional Materials Program sponsored by the University to create a variety of visual aids for educational use.



## SUMMER SESSIONS

The summer sessions are designed to meet the needs of regularly enrolled and visiting students and of teachers and others who wish to improve their professional competence. Cal Poly offers summer sessions on campus ranging from one week to six weeks long. The course offerings are broad, leading to various degrees and credentials, as well as providing for continuing professional development in many fields.

Admission to the summer sessions does not require completion of the matriculation process. Registration in the summer session does not insure the privilege of enrollment in one of the regular quarters. Post-baccalaureate students should consult the *Graduate Studies Announcement* regarding requirements for classification and applicability of credit toward their degree objectives. Credit earned as a nonmatriculated summer session student may not necessarily be applicable to graduate degree objectives.

The summer sessions are supported by fees collected from the students who enroll in the courses. There is no application fee for summer sessions. Requests for application forms, information on course offerings and regulations should be addressed to the Associate Dean, Extended Education.

## EXTENSION PROGRAM

A variety of extension courses is offered to assist in meeting the educational needs of the residents of (San Luis Obispo, Santa Barbara, and southern Monterey Counties). Courses are arranged in an area when student demand is adequate to finance the instruction. Extension program offerings may be full quarter classes or special interest seminars or workshops of shorter duration.

Prospective extension students need not apply for admission to the University. Enrollment in an extension course does not imply admission as a matriculated student for any quarter. A listing of Extension programs and courses is published quarterly and is available from the Associate Dean, Extended Education. Extension students may also enroll in regular course offerings. Extension students who desire to enroll in the University's on-campus courses should obtain a "Petition to Take Regular Course by Concurrent Enrollment Through Extension Program" from the Extended Education office.

The maximum extension credit which may be accepted toward the bachelor's degree is 36 quarter units. No more than 9 quarter units of extension work may be counted toward the master's degree.

## CONFERENCES, SEMINARS, SHORT COURSES, WORKSHOPS

The University provides facilities, faculty and staff for programs of special design appropriate to its educational objectives. These professional short courses, workshops and conferences have included such titles as: Agricultural Leadership Training Program; Alternate Energy Systems Workshop; American Institute of Floral Design Symposium; California Agricultural Teachers' Association Skills Week and Annual Conference; California Association of Refrigeration Engineers Society Conference; California Measurement Science Conference; California Nurserymen's Refresher Course; Future Farmers of America State Convention; Newspaper Circulation Workshop; Physical Education Workshop; Plant Engineering Workshop; Pressure Vessel Inspectors' Short Course; and the Puppeteers of America National Festival.



## INTERNATIONAL PROGRAMS

The California State University and Colleges (CSUC) offers opportunities for students to pursue their studies at a distinguished foreign university or special program center. Under the auspices of the CSUC Office of International Programs, participants in this program are concurrently enrolled at their home campus, where they earn academic credit and maintain campus residency, and at an overseas institution of higher education.

Cooperating universities abroad include the University of Provence, France; the Universities of Heidelberg and Tübingen, Germany; the Hebrew University of Jerusalem in Israel; the University of Florence, Italy; the Universidad Ibero-Americana, Mexico; the Universidad Católica, Peru; the Universities of Granada and Madrid, Spain; the University of Uppsala, Sweden; Lincoln University College of Agriculture and Massey University, New Zealand; and Waseda University of Japan. In the United Kingdom, cooperating universities (which may vary from year to year) include, among others, Aberdeen, Edinburgh, Bangor, Heriot-Watt, Leicester, London, Manchester, Oxford, Liverpool, Lampeter, Sheffield, and Strathclyde. In addition, CSUC students may attend a special program in Taiwan, Republic of China, or an architecture program in Copenhagen, Denmark.

Eligibility for application is limited to those students who will have upper division or graduate standing by September 1980 at a CSUC campus; who have demonstrated the ability to adapt to a new cultural environment; and, who, in the cases of France, Germany, Mexico, Peru, and Spain, will have completed at least two years of college-level study in the language of instruction at the host university, or possess equivalent knowledge of the language. At the time of application, students must have a minimum cumulative grade point average (GPA) for all college-level work of 2.75, except for the programs in Israel, New Zealand, Peru, and the United Kingdom where a minimum GPA of 3.0 is required. Selection is competitive and is based on home campus recommendations and the applicant's academic record. Final selection decisions are made by a statewide committee of faculty members, except for the programs in New Zealand and the United Kingdom where final selections are made by the respective host universities.

The Office of International Programs supports all tuition and other academic and administrative costs overseas for each of its participants to the same extent that such funds would be expended to support similar costs in California. Students assume costs for pre-departure orientation, insurance, transportation, housing, and meals. Home campus registration and other fees and personal incidental expenses or vacation travel costs while abroad are also paid by the student. Nonresident students are subject to nonresident fees. The Office of International Programs collects and administers funds for those items which the program must arrange or can negotiate more effectively, such as home campus fees, orientation costs, insurance, outbound transportation, and, in some centers, housing. International Programs participants may apply for any financial aid available at their home campuses, except for campus work-study.

Applications for the 1980-81 academic year must be submitted before February 9, 1980, except for New Zealand and the United Kingdom. Applications for the New Zealand program must be submitted by May 11, 1980, for participation during calendar year 1981. (The academic year in New Zealand begins in February and ends in October.) United Kingdom applications must be submitted by January 5, 1980.

Detailed information and application materials may be obtained from the International Programs Office; further information may also be obtained by writing to The California State University and Colleges International Programs, 400 Golden Shore, Suite 300, Long Beach, California 90802.

## ACADEMIC POLICIES

### ACADEMIC OBLIGATIONS

All students are expected to be diligent in the pursuit of their courses of study in order that both they and the State will receive maximum benefit from the educational opportunities provided.

Students are expected to satisfy the academic demands required by their instructors in such ways as they may set forth, in order to satisfy the instructor that they are performing their assignments in a proper manner.

Instructors are expected to give first priority to meeting their scheduled classes and other assigned responsibilities, including keeping regular office hours for student conferences.

An instructor, with the President's approval, may at any time exclude from a course any student guilty of unbecoming or disorderly conduct toward the instructor or the class. The instructor may refer the case of misconduct to the Dean of Students for disciplinary action.



## CENSUS DATE

The Census Date is defined to be the 15th academic day of each quarter. On this date, all transactions leading to the establishment of enrollment data for the quarter are finalized. This is the last day for students to withdraw from a class without penalty, file a petition for Credit-No Credit grading in a course, or change from Credit status to Audit status in a course.

## CLASS ATTENDANCE

Students are expected to be regular in attendance to keep the quality and quantity of work high. Absence from classes is regarded as serious, and work missed is not excused.

An excused absence can be allowed only by the instructor in charge of the class upon consideration of the evidence justifying the absence presented by the student. An excused absence merely gives the individual who missed the class an opportunity to make up the work and is not an excuse from the work required.

## MAXIMUM LOADS

The maximum load for regular students is 20 quarter units of work including audited courses and concurrent work at other colleges; the only exceptions are made with the advance approval of the student's major department head and completion of a petition to carry excess load which is available at the Records Office. Maximum load requirements may be waived only on presentation of evidence of ability to carry successfully such a group of courses. Maximum load for graduate students is 16 units per quarter.

## SCHOLARSHIP REQUIREMENTS

Uniform standards for academic probation or disqualification, and for administrative-academic probation or disqualification, are in effect at all campuses of the California State University and Colleges. Undergraduate students may be placed on academic probation and later be disqualified, or be placed on administrative-academic probation and later be disqualified, when they do not meet these standards.

Students who have been placed on academic probation, administrative-academic probation, or who have been notified of their disqualification may request review of such action by the dean of the school taking the action. Students who have been disqualified for inadequate progress or performance will not be readmitted until presentation of satisfactory evidence that they have improved their chances of academic success. The request for readmission will be referred to the dean of the school in which the student wishes to enroll.

Students on academic probation may not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. This includes, but is not limited to, such groups as: athletic teams, debate teams, drama casts, judging teams, ASI councils, boards and committees. Such students may not hold an office in a student organization, nor may they be editors, managers, or hold similar positions on student publications. However, students on academic probation may participate in such activities as club membership, intramurals, and music which do not include travel and the official representation of the University.

Certain groups may have set higher standards than the minimum for specific positions or areas of responsibility that require considerable commitments of time and energy.

## ACADEMIC PROBATION OR DISQUALIFICATION

Both academic progress toward degree objective and quality of academic performance are considered in the determination of a student's eligibility to remain enrolled. An undergraduate student becomes subject to academic probation or disqualification under the conditions shown below. For minimum scholarship standards applicable to graduate and post-baccalaureate students see the GRADUATE STUDIES ANNOUNCEMENT.

- I. Academic Probation: An undergraduate student is subject to academic probation if at any time his or her cumulative grade point average in all college work attempted or the student's Cal Poly cumulative grade point average falls below 2.0 or if during any term while enrolled he or she fails to earn at least two times as many progress points as all units attempted. The student will be advised of probation status promptly.

An undergraduate student will be removed from academic probation when the student's cumulative grade point average in all college work attempted and the student's Cal Poly cumulative grade point average is 2.0 or higher *and* when he or she earns at least twice as many progress points as all units attempted in a term.

- II. Academic Disqualification: An undergraduate student on academic probation *may* be disqualified when his or her cumulative grade point average for all college work attempted or his or her Cal Poly cumulative grade point average is 7 or more grade points below 2.0 (C), or, regardless of class level or cumulative grade point average, when in any term he or she fails to earn at least twice as many progress points as units attempted. Such a student on academic probation *shall* be subject to disqualification:
- A. As a freshman or sophomore student (less than 90 quarter units of college credit completed) whose average falls  $2\frac{1}{2}$  or more grade points below a 2.0 (C) average on all units attempted or in all units attempted at Cal Poly.
  - B. As a junior student (90 to 134 quarter units of college credit completed) whose average falls  $1\frac{1}{2}$  or more grade points below a 2.0 (C) average on all units attempted or in all units attempted at Cal Poly.
  - C. As a senior student (135 or more quarter units of college credit completed) whose average falls 9 or more grade points below a 2.0 (C) average on all units attempted or in all units attempted at Cal Poly.

A student who is placed on probation or who is subject to disqualification at the end of an enrollment period will be notified by the dean of the school in which the student is enrolled as soon as possible following the end of the quarter in which the student's performance fails to meet the prescribed conditions. In cases where a student ordinarily would be disqualified at the end of a term save for the impossibility of making timely notification, the student may be advised that the disqualification is to be effective at the end of the next term.

#### ADMINISTRATIVE-ACADEMIC PROBATION OR DISQUALIFICATION

An undergraduate or graduate student may be placed on administrative-academic probation by action of the dean of the school in which the student is enrolled for any of the following reasons:

- A. Withdrawal from all or a substantial portion of a program of studies in two successive terms or in any three terms.
- B. Repeated failure to progress toward the stated degree or program objective when such failure appears to be due to circumstances within the control of the student.
- C. Failure to comply, after due notice, with an academic requirement or regulation which is routine for all students or a defined group of students.

When such action is taken, written notice will be provided including a statement of the conditions for removal from probation and the circumstances which would lead to disqualification, should probation not be removed. If disqualified, the student will receive written notification from the dean of the school in which the student is enrolled including an explanation of the basis for the action.

#### ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association (NCAA), the Association of Intercollegiate Athletics for Women (AIAW), and specifically by current Conference and University regulations. The Director of Athletics is responsible for maintaining up-to-date intercollegiate athletics eligibility rules applicable to the University. The Faculty Athletic Representative has the responsibility for the interpretation of the NCAA, AIAW, Conference, and University rules for determining student eligibility to represent the University in intercollegiate athletic events.

## GRADING SYSTEM

The following marking and grading system is in effect:

		Grade Points Earned Per Unit	Progress Points Earned per Unit
A	Superior Attainment of Course Objectives .....	4	4
B	Good Attainment of Course Objectives .....	3	3
C	Acceptable Attainment of Course Objectives .....	2	2
D*	Poor Attainment of Course Objectives .....	1	1
F	Non-Attainment of Course Objectives .....	0	0
CR	Credit .....	—	2
NC	No Credit .....	—	0
AU	Audit .....	—	—
I	Incomplete (authorized) .....	—	—
U	Incomplete (unauthorized) .....	0	0
SP	Satisfactory Progress .....	—	—
RD	Report Delayed .....	—	—
W	Withdrew .....	—	—

Final grades signifying student accomplishment are assigned for each course by the instructor. These grades are A,B,C,D,F,U,CR, and NC. A grade point average for each student is computed by dividing the total grade points earned by the total units in which the student received a grade of A,B,C,D,U, or F. Courses for which CR, NC, AU, I, RD, SP, or W were assigned are not included in the grade point computation.

Students are required to earn twice as many progress points as total units attempted each term in order to avoid being subject to probation. For this purpose courses with grades of CR and NC are included in addition to those with A,B,C,D, U and F.

### AUDIT

The "AU" symbol indicates that a student was officially enrolled in class, participated in class, but was not required to be examined on course materials. Enrollment as an Auditor is subject to the permission of the instructor. Procedures for auditing courses are published in the quarterly *Class Schedule*. Refer to "Auditing of Courses" section for additional information.

### INCOMPLETE (AUTHORIZED)

An incomplete signifies that a portion of required course work has not been completed and evaluated in the prescribed time period due to unforeseen, but fully justified, reasons and that there is still a possibility of earning credit. It is the responsibility of the student to bring pertinent information to the instructor who will determine the means by which the remaining course requirements will be satisfied. A final grade is assigned when the work agreed upon has been completed and evaluated. The student is not permitted to reenroll in the course as a means to complete course requirements.

An "I" must be made up within one calendar year immediately following the end of the term on which it was assigned. This limitation prevails whether or not the student maintains continuous enrollment. Failure to complete the assigned work will result in an "I" being counted as equivalent to an 'F' (or an 'NC') for grade point average and progress point computation.

### INCOMPLETE (UNAUTHORIZED)

The symbol "U" indicates that an enrolled student did not withdraw from the course but failed to complete course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point average and progress point computation this symbol is equivalent to an "F".

\* If a letter grade of "D" is received in a course which is a prerequisite for another course, the student is encouraged to repeat the prerequisite course before attempting the next course in sequence.

## SATISFACTORY PROGRESS

The "SP" symbol is used in connection with courses that extend beyond one academic term. It indicates that work is in progress and has been evaluated and found to be satisfactory to date, but that assignment of a grade must await completion of additional work. Re-enrollment is permitted prior to the assignment of the final grade provided that the total permissible number of units for the course or courses is not exceeded. Work is to be completed within a stipulated time period. This may not exceed one year except for graduate degree theses for which the time may be up to two years, but may not exceed the overall time limit for completion of all Master's degree requirements. Any extension of time limit must receive prior authorization by the dean of the school in which the student is a degree candidate.

## CREDIT-NO CREDIT GRADING

Some courses, *as indicated in their catalog descriptions*, are offered on a Credit-No Credit grading basis only.

The following conditions apply when a student *elects* to take for Credit-No Credit grading those courses which are *not* designated by the University as being graded on an exclusive Credit-No Credit basis.

- a. Up to 2 courses (not to exceed 8 units) may be taken per student per quarter on a Credit-No Credit grading basis; a maximum total of 15 courses (not to exceed 45 units) may be elected per student for Credit-No Credit grading.
- b. The course may not be repeated as Credit-No Credit if the student has previously received a grade of "D", "U" or "F" in that course. The course may be repeated for Credit-No Credit only if the student has previously received a grade of "NC" in that course.
- c. Students desiring to elect a course on a Credit-No Credit grading basis must be currently enrolled in the course and must complete the appropriate form available from the Records Office. Such declaration for Credit-No Credit grading must be filed not later than the end of the third week of instruction of the quarter. Students may not change from one grading system to the other after the end of the third week of instruction of the quarter.
- d. Students will be given a grade of "Credit" for accomplishment equivalent to a grade of "C" or better. "No Credit" will be given for accomplishment equivalent to "D" or "F" grades. Instructors will submit conventional letter grades to the Registrar's Office where they will be converted to Credit-No Credit Grades.
- e. Courses in the student's major (designated as "Courses in Major" on the student's major curriculum sheet) may not be taken for Credit-No Credit grading unless designated by the University for exclusive Credit-No Credit grading.
- f. The applicant for a Credit-No Credit grade must have at least a 2.0 grade point average in cumulative Cal Poly work.
- g. Units earned in courses for which the grade was "Credit" will count toward satisfaction of degree requirements for undergraduate students only. No courses taken on a Credit-No Credit grading basis may be used to satisfy graduate program degree requirements.
- h. Grades of "Credit" or "No Credit" are not included in determining the student's grade point average.
- i. Nonmatriculated students in the Extension Program, Summer Session and Workshops must meet the same requirements as matriculated students to elect courses on a Credit-No Credit grading basis. (The 2.0 GPA requirement is waived in the case of nonmatriculated students having no previous course work recorded at Cal Poly.)

## REPEATING A COURSE

Students may enroll in a course for credit more than once only if the catalog course description states that the course may be repeated for credit or under one of the following policies:

1. A course taken at this or at another university or college in which a grade of "D", "F", "U" or "NC" was received may be repeated here with the new grade recorded along with the prior grade. The grade earned by repeating the course will be awarded the appropriate progress points, grade points and units attempted and completed.
2. Undergraduate students may repeat up to 20 units of "D" or "F" and the original grade points and units will not be counted in the calculation of the grade point average. However,

under the terms of this rule, a notice of intent to repeat a course must be filed in the Records Office prior to the end of the seventh week of instruction during the quarter in which the course is repeated.

3. Except where noted in the specific course description that the course may be repeated for credit, a student may not enroll in (except as an auditor) or receive credit by examination for any course in which a grade of "C" or higher, including "CR" has been received. A course may not be challenged by examination during the same quarter that the student is enrolled in the course.

### INVALIDATION OF PREVIOUS RECORDS

Under certain circumstances an undergraduate student may petition the University to remove from consideration associated with requirements for the baccalaureate degree up to two semesters or three quarters of undergraduate work taken at least five years previously at any college. Further information and petition forms are available from the Director of Admissions, Records and Evaluations.

### WITHDRAWALS FROM COURSES

The "W" symbol indicates that the student was permitted to drop the course after the 15th day of instruction with the approval of the instructor and appropriate campus officials. It carries no adverse connotation of quality of student performance and is not used in calculating grade point average or progress points.

A student may withdraw from a course without academic penalty during the initial 15 instructional days of the quarter provided the instructor is formally notified. Between the 15th instructional day and the end of the 7th week of instruction a student must request permission to withdraw from a course by processing a petition which is available at the Records Office. The petition will be approved and withdrawal authorized only if there are serious and compelling reasons for withdrawal in the judgment of the instructor and department head.

After the end of the 7th week of instruction withdrawals are permitted only if the withdrawal is based on an emergency situation clearly beyond the control of the student. In some cases a final or incomplete grade may be assigned for courses in which sufficient work has been completed to permit an evaluation to be made. The student must request permission to withdraw as specified above, or request grade assignment, both of which are subject to approval by designated campus officials. Any student who fails to provide notification or who fails to obtain formal approval to withdraw will be subject to failing grades (U or F).

### WITHDRAWAL FROM THE UNIVERSITY

A student is permitted to withdraw from the University upon request and without restriction or penalty until the end of the 7th week of the quarter. After the 7th week, withdrawals from the University must be approved by campus officials. Disapproved, unauthorized, or unofficial withdrawal from the University will subject the student to failing grades in each course (U or F).

The student or duly authorized representative of the student is required to submit the request and reason for withdrawal in writing to the Registrar. The date of withdrawal will be established as the circumstances indicate or as determined by the Registrar.

The student may be eligible for a full or partial refund of registration fees depending upon the time and circumstances of withdrawal from the University. A written application for refund is required. Specific limiting dates and application procedures are published in the quarterly class schedules.

### THE FAIRNESS BOARD

The Fairness Board is the campus group primarily concerned with providing "due process" for the students and instructors at the University, particularly in terms of student/faculty relationships. The Board hears grade appeals based on the grievant's belief that the instructor has made a mistake, shown bad faith or incompetence, or been unfair. However, the Fairness Board also may hear cases involving student/administration relationships. In all cases, the Board's authority is limited to actions consistent with other campus and system policies.

Details and procedures relating to the operation of the Fairness Board may be obtained from the Campus Administrative Manual located in departmental offices or from the Judicial Affairs Office.

### PROGRAM CHANGES

An official program card is prepared for each student who completes the formal registration process. All program cards are distributed by the student's major department and all changes to the official program become the responsibility of the student. Time periods have been established following registration during which students may attempt to add new courses or withdraw from existing courses. These periods are defined as the last day to add courses or 6th academic day, and the last day to withdraw from classes without petition, 15th academic day, or third week census date. Specific dates for completing these transactions are published in the annual academic calendar and in each quarterly class schedule. The student must ensure that each instructor is properly notified before the expiration of the time limits and that the instructor formally acknowledges the change to the student's official program. A revised official program card will be prepared for each student which will list the courses in which a final grade will be awarded.

The student has approximately one week in which to add a course, complete the late-registration process, increase units in a course, and to change from audit to credit. Each change requires that the student initiate contact with the instructor and present a valid Campus Services Card which verifies enrollment for the quarter in progress. Exceptions are made for late registrants and for selected extension students who are required to have all enrollment transactions completed at the end of the first week and all fees paid by the third week census date.

The student has until the third week to withdraw from a course without penalty or entry on the academic record, and to change from credit to audit status in a course. In either instance, it is the student's responsibility to notify the instructor. At the first class meeting only, the instructor may delete a student's name from the official class list if the student is not present or has not been excused. The student must not assume that voluntary absence from class means automatic withdrawal. At the third week census date, the instructor must assume that any student who has not provided notification of withdrawal will remain officially enrolled in the course. For program changes after the third week see under **WITHDRAWALS**.

A special provision, applicable only to students in their first quarter at the University, permits the substitution, without prejudice, of a prerequisite course in a sequence of courses for a later course in the sequence through the end of the fourth week. Only the substituted course appears on the transcript and the grade is based on performance after the change.

### CHANGES IN CURRICULUM

Students who find that they are preparing for a profession which does not provide the type of education for which they have the greatest aptitude should contact their adviser and the University Counseling Center for advice and assistance in making curriculum changes. Students will be permitted to apply for a change of major curriculum after six weeks in residence during which they follow the prescribed curriculum for their current major as far as possible. Admission to a new curriculum will depend on the availability of space within the limitations imposed by budget, faculty, and facilities.

Transfer from one curriculum to another does not in any way change a student's scholastic standing.

Transfer from a technical to a degree curriculum may be permitted subject to scholarship requirements and completion of the specified number of units in residence.

Upon transfer from a degree to a technical curriculum, at the campus, a student's record is evaluated in terms of the technical curriculum. Courses completed prior to transfer which are applicable to the required courses in the technical curriculum will be transferred intact. The remaining courses completed prior to transfer must apply as electives up to, but not in excess of, the number of elective units specified in the technical curriculum. In the case of an excess of elective units, the student may choose which units shall apply. For purposes of computing the grade point average for graduation, only those courses transferred as outlined above and those taken subsequent to transfer will be used.

## REVISION OF CURRICULAR REQUIREMENTS

A student remaining on *continuous attendance* in regular sessions and continuing in the same curriculum in any state university or college, in any of the California community colleges or in any combination of California community colleges and state university and colleges, may, for purposes of meeting graduation requirements, elect to meet the graduation requirements in effect either at the time of entering the curriculum or at the time of graduation therefrom, except that substitutions for discontinued courses may be authorized or required by the student's school dean.

## CURRICULUM DEVIATION

Although a curriculum is specified for each major, under certain conditions a student may be permitted some deviation from the established curriculum. Detailed instructions for applying for a curriculum deviation may be obtained from the Records Office.

## HOLDING OF RECORDS

Student records may be placed in a "Hold" status because of financial or other obligations to the University. The "Hold" status authorizes the University to withhold the "permit to register," release of transcripts, and other services normally provided to the student. The student's records will be held until the obligation is cleared to the satisfaction of the office or department placing the "Hold."

## TRANSFER TO OTHER COLLEGES

Students who plan to transfer from California Polytechnic State University to another college or university should, at the earliest possible date, request that their transcript of academic record be forwarded by the Records Office. Any evaluation of transcripts presented to another college or university will be made by the new institution in terms of its established policies.

## PRIVACY RIGHTS OF STUDENTS IN EDUCATION RECORDS

The federal Family Education Rights and Privacy Act of 1974 (20 U.S.C. 1232g) and regulations adopted thereunder (45 C.F.R. 99) and California Education Code Section 67100 et seq, set out requirements designed to protect the privacy of students concerning their records maintained by the campus. Specifically, the statute and regulations govern 1) access to student records maintained by the campus, and 2) the release of such records. In brief, the law provides that the campus must provide students access to official records directly related to the student and an opportunity for a hearing to challenge such records on the grounds that they are inaccurate, misleading or otherwise inappropriate; the right to a hearing under the law does not include any right to challenge the appropriateness of a grade as determined by the instructor. The law generally requires that written consent of the student be received before releasing personally identifiable data about the student from records to other than a specified list of exceptions. The institution has adopted a set of policies and procedures concerning implementation of the statutes and the regulations on the campus. Copies of these policies and procedures may be obtained at the Judicial Affairs Office. Among the types of information included in the campus statement of policies and procedures is: 1) the types of student records and the information contained therein; 2) the official responsible for the maintenance of each type of record; 3) the location of access lists which indicate persons requesting or receiving information from the record; 4) policies for reviewing and expunging records; 5) the access rights of students; 6) the procedures for challenging the content of student records; 7) the cost which will be charged for reproducing copies of records; and 8) the right of the student to file a complaint with the Department of Health, Education and Welfare. An office and review board have been established by the Department to investigate and adjudicate violations and complaints. The office designated for this purpose is: The Family Educational Rights and Privacy Act Office (FERPA), Department of Health, Education and Welfare, 330 Independence Avenue, SW, Washington, D.C. 20201.

The campus is authorized under the Act to release public directory information concerning students. Directory information includes the student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, the most recent previous educational agency or institution attended by the student, and any other information authorized in writing by the student. The above designated information is subject to release by the campus at any time unless the campus has received prior written objection from the student specifying information which the student requests not be released. Written objections must be filed with the Director, Judicial Affairs, within three working days of completing registration, on a form provided by the Director.

The campus is authorized to provide access to student records to campus officials and employees who have legitimate educational interests in such access. These persons are those who have responsibilities in connection with the campus' academic, administrative or service functions and who have reason for using student records connected with their campus or other related academic responsibilities.

### USE OF SOCIAL SECURITY NUMBER

Applicants are required to include their Social Security account number in designated places on applications for admission pursuant to the authority contained in Title 5, *California Administrative Code*, Section 41201. The Social Security account number is used as a means of identifying records pertaining to the student as well as identifying the student for purposes of financial aid eligibility and disbursement and the repayment of financial aid and other debts payable to the institution.

### HONORS

Candidates for bachelor's degrees are eligible for "Graduation with Honors" if they have earned a 3.2 or better cumulative grade point average, including all college level work attempted at Cal Poly and all college level work accepted from other institutions.

Similarly, those with a corresponding average of 3.6 or better are eligible for "Graduation with Highest Honors."

Graduation with Honors is officially calculated at the time the graduate has *completed* graduation requirements.

The "President's Honors List" is compiled at the end of each college year to honor those undergraduate students who have demonstrated consistent achievement, as represented by being named to the "Dean's Honors List" for any three of the four quarters of the college year.

The "Dean's Honors List" is compiled at the end of each quarter to honor undergraduate students who have completed 12 or more units during the quarter with a grade point average which places them in the top 15 percent of the students in their school.

Entering freshmen who rank in the top five percent of high school graduates are granted "Honors at Entrance."

### STUDENT CONDUCT AND DISCIPLINE

It is expected that all California Polytechnic State University students are enrolled for serious educational pursuits and that they will conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at Cal Poly are willing to assume the responsibilities of citizenship in the campus community. Association in such a community is voluntary, and students may withdraw from it at any time that they consider the obligations of membership disproportionate to the benefits. While enrolled, students are subject to campus authority which includes the prerogative of dismissing those whose conduct is inimical to the aims of an institution of higher education.

While enrolled, students are subject to the regulations governing discipline stated in Education Code Section 22505 and in Title 5 of the California Administrative Code, Sections 41301-41304, and to such rules and regulations as have been approved and promulgated by authority of the President. Copies of 5 Cal Adm Code 41301 and 41302, which deal specifically with student disciplinary regulations, are distributed to all new students during each registration period and are posted officially in the Administration Building. Other applicable regulations are contained in this Catalog, in the Campus Administrative Manual, and in other official University publications.



## **STUDENT DISCIPLINARY PROCEDURES**

The Chancellor of the California State University and Colleges has established procedures for student disciplinary matters which are included in the Campus Administrative Manual, the official campus publication of policies and procedures which is available in the library for easy reference.

Educating students to their responsibilities as good citizens of the University and of the community is a campus-wide responsibility requiring the cooperation and understanding of the entire campus. Title 5 of the California Administrative Code assigns to the President responsibility for enforcement of student disciplinary regulations. The President has delegated to the Director of Judicial Affairs the responsibility and commensurate authority to administer student disciplinary regulations but has retained decision-making authority on cases which proceed to a hearing at the local campus level.

When the conduct or behavior of a student is such that he or she is alleged to be in violation of applicable provisions of the Education Code, regulations of the Board of Trustees, and campus rules and orders issued thereunder, the case is referred to the Director of Judicial Affairs for investigation of the facts leading to the allegation. If the investigation reveals that there is reason to believe that an infraction has been committed by a student, disciplinary procedures as described in the Campus Administrative Manual will be initiated.

### **ELIGIBILITY FOR STUDENT ACTIVITIES**

Students on either academic or disciplinary probation may not participate on intercollegiate teams nor may they hold positions of leadership in chartered student organizations or coded student government groups. Students on probation may participate in such student organizations and groups as members but they may not hold an office or represent the University or the Associated Students, Incorporated, in any official capacity.

### **STUDENT INVOLVEMENT IN DISCIPLINARY PROCEDURES**

Student Hearing Boards conduct hearings in the residence halls and make recommendations to the Director of Judicial Affairs. In addition, students have majority representation on the Student Appeals and Advisory Commission which also includes members of the faculty and of the administrative staff; this group makes recommendations to the President in appropriate cases.

### **PROCEDURAL DUE PROCESS**

In all matters of student discipline, each person charged with a violation is given every courtesy, privilege, and right under the law and within the context of the uniqueness of a public institution of higher learning.

### **CAUSES FOR DISCIPLINARY ACTION**

Causes and methods for disciplinary action are cited in Title 5 of the California Administrative Code, Sections 41301 and 41302, which read:

41301. Expulsion, Suspension and Probation of Students. Following procedures consonant with due process established pursuant to Section 41304, any student of a campus may be expelled, suspended, placed on probation or given a lesser sanction for one or more of the following causes which must be campus related:

- (a) Cheating or plagiarism in connection with an academic program at a campus.
- (b) Forgery, alteration or misuse of campus documents, records, or identification of knowingly furnishing false information to a campus.
- (c) Misrepresentation of oneself or of an organization to be an agent of a campus.
- (d) Obstruction or disruption, on or off campus property, of the campus educational process, administrative process, or other campus function.
- (e) Physical abuse on or off campus property of the person or property of any member of the campus community or of members of his or her family or the threat of such physical abuse.
- (f) Theft, of, or non-accidental damage to, campus property, or property in the possession of, or owned by, a member of the campus community.

(g) Unauthorized entry into, unauthorized use of, or misuse of campus property.  
(h) On campus property, the sale or knowing possession of dangerous drugs, restricted dangerous drugs, or narcotics as those terms are used in California statutes, except when lawfully prescribed pursuant to medical or dental care, or when lawfully permitted for the purpose of research, instruction or analysis.

(i) Knowing possession or use of explosives, dangerous chemicals or deadly weapons on campus property or at a campus function without prior authorization of the campus president.

(j) Engaging in lewd, indecent, or obscene behavior on campus property or at a campus function.

(k) Abusive behavior directed toward, or hazing of, a member of the campus community.

(l) Violation of any order of a campus president, notice of which had been given prior to such violation and during the academic term in which the violation occurs, either by publication in the campus newspaper, or by posting on an official bulletin board designated for this purpose, and which order is not inconsistent with any of the other provisions of this Section.

(m) Soliciting or assisting another to do any act which would subject a student to expulsion, suspension or probation pursuant to this Section.

(n) For purposes of this Article, the following terms are defined:

(1) The term "member of the campus community" is defined as meaning California State University and Colleges Trustees, academic, non-academic and administrative personnel, students, and other persons while such other persons are on campus property or at a campus function.

(2) The term "campus property" includes:

(A) real or personal property in the possession of, or under the control of, the Board of Trustees of the California State University and Colleges, and

(B) all campus feeding, retail, or residence facilities whether operated by a campus or by a campus auxiliary organization.

(3) The term "deadly weapons" includes any instrument or weapon of the kind commonly known as a blackjack, sling shot, billy, sandclub, sandbag, metal knuckles, any dirk, dagger, switchblade knife, pistol, revolver, or any other firearm, any knife having a blade longer than five inches, any razor with an unguarded blade, and any metal pipe or bar used or intended to be used as a club.

(4) The term "behavior" includes conduct and expression.

(5) The term "hazing" means any method of initiation into a student organization or any pastime or amusement engaged in with regard to such an organization which causes, or is likely to cause, bodily danger, or physical or emotional harm, to any member or the campus community; but the term "hazing" does not include customary athletic events or other similar contests or competitions.

(o) This Section is not adopted pursuant to Education Code Section 89031.

(p) Notwithstanding any amendment or repeal pursuant to the resolution by which any provision of this Article is amended, all acts and omissions occurring prior to that effective date shall be subject to the provisions of this Article as in effect immediately prior to such effective date.

41302. Expulsion, Suspension or Probation of Students; Fees and Notification. The President of the campus may place on probation, suspend, or expel a student for one or more of the causes enumerated in Section 41301. No fees or tuition paid by or for such student for the semester, quarter, or summer session in which he or she is suspended or expelled shall be refunded. If the student is readmitted before the close of the semester, quarter, or summer session in which he or she is suspended, no additional tuition or fees shall be required of the student on account of the suspension. In the event that a student who has not reached his or her eighteenth birthday and who is a dependent of his or her parent(s) as defined in Section 152 of the Internal Revenue Code of 1954 is suspended or expelled, the President shall notify his or her parent or guardian of the action by registered mail to the last known address, return receipt requested.

During periods of campus emergency, as determined by the President of the individual campus, the President may, after consultation with the Chancellor, place into immediate effect any emergency regulations, procedures, and other measures deemed necessary or appropriate to meet the emergency, safeguard persons and property, and maintain educational activities.

The President may immediately impose an interim suspension in all cases in which there is reasonable cause to believe that such an immediate suspension is required in order to protect lives or property and to insure the maintenance of order. A student so placed on interim suspension shall be given prompt notice of charges and the opportunity for a hearing within 10 days of the imposition of interim suspension. During the period of interim suspension, the student shall not, without prior written permission of the President or designated representative, enter any campus of the California State University and Colleges other than to attend the hearing. Violation of any condition of interim suspension shall be grounds for expulsion.

Among the specific causes for which the University will take such disciplinary action are: the bringing or drinking of alcoholic beverages on campus; being intoxicated on campus; repeated violations of campus rules and regulations, including those pertaining to driving and parking of vehicles.

In accordance with provisions of Section 41301 above, the President has issued and posted officially an order which prohibits the consumption, possession, or use of alcoholic beverages on campus. Students who violate this order are subject to the penalties provided for in Sections 41301 and 41302, Title 5 of the California Administrative Code.

Disciplinary action varies with the severity of the violation. If the unacceptable behavior involves use of motor vehicles, the student may be restricted from driving or parking on campus. If the unacceptable behavior involves matters pertaining to on-campus housing or dining, the student may be restricted from living or dining on campus.

## Student Activities and Services



## STUDENT ACTIVITIES

The campus provides an integrated program of classroom and laboratory instruction, and cocurricular activities. A professional staff in the Activities Planning Center is responsible for providing a wide spectrum of meaningful activities for all students. Leadership development groups, conferences, and classes are offered to increase the effectiveness and efficiency of student officers in student organizations and government. Many of the programs are located in the University Union, a student-financed facility.

### STUDENT GOVERNMENT

All students are members of the student association known as the Associated Students, Inc., of California Polytechnic State University, San Luis Obispo. The government of student affairs is vested in the Student Affairs Council, the members of which are selected according to regulations established in the student body bylaws. In addition, there are boards established to oversee publications, athletics, music, University Union programming, Week of Welcome, ethnic programs, and Poly Royal. All interested students have an opportunity to participate in student government.

### ATHLETICS

Intercollegiate competition is held under the rules and auspices of the National Collegiate Athletic Association and the Association of Intercollegiate Athletics for Women. Conference competition is maintained in most sports as a member of the California Collegiate Athletic Association and Southern California Athletic Association. Intercollegiate competition is offered for men in the sports of football, basketball, wrestling, baseball, track, swimming, water polo, golf, cross country, soccer, tennis and volleyball. Women's sports are conducted in volleyball, track, basketball, tennis, and softball. Junior varsity competition is offered in sports where competition is available and sufficient interest warrants it. For eligibility rules see ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS.

### INTRAMURALS

The Physical Education Department offers an intramural program which provides opportunities for all students to participate in a variety of individual, dual, and team sports, many of which are coeducational. The objectives of the intramural program are to provide education in physical skills, recreation, social contact, carry-over activities, and physical fitness through the give-and-take of competition.

### CAMPUS ORGANIZATIONS

Clubs and organizations cover all departments and activities, and the opportunity exists for every student to take an active part in club life. There are departmental and professional organizations, hobby-interest clubs and many others serving the areas of honor societies, service clubs, residence groups, ethnic groups, and religious faith groups.

### MEDIA

Publications of the student body at California Polytechnic State University, San Luis Obispo, are not only written and edited by students, but are also printed on campus as laboratory work for students majoring in Graphic Communications. Editorial and photographic work for publications is handled primarily by students of the journalism classes. *Mustang Daily* is the official newspaper of the associated students. In addition, the Journalism Department operates KCPR-FM, a student station heard on campus and in the surrounding community.

### STUDENT COMMUNITY SERVICES

A comprehensive program of student volunteer assistance to people who need help, both on and off campus, is coordinated in the Activities Planning Center. Services include such things as tutoring, recreation, and helping the handicapped of all ages.

## **POLY ROYAL**

Each year during the last weekend in April Cal Poly holds an open house exhibition and show conducted primarily by the Associated Students. This event is known as Poly Royal. Its purpose is to display work accomplished during the year by students. Each department on the campus prepares displays that reflect the curriculum within that department and its relation to employment, as well as the activities and success of the graduates. Besides the shows and exhibits there are many entertainment features such as intercollegiate baseball, swimming, and rodeo. Other special events include music department concerts, dramatic presentations, aquacade, carnival, various judging contests, and a mathematics contest featuring students from high schools throughout the State.

## **STUDENT SERVICES**

Cal Poly provides a number of services designed to help students in their college work. Some of the services are directed toward group activities and experiences, others toward helping students overcome individual problems.

### **COUNSELING SERVICES**

The Counseling Center offers assistance and growth experiences for a wide variety of student needs and environmental improvement. Services include counseling, career development, learning assistance, testing, and consultation. In addition to receiving help in time of crisis, students can develop skills in such areas as communication; problem solving; career planning; decisionmaking; study habits and techniques; and ability, interest, or personality assessment.

Faculty and staff can consult with the Center for help with such areas as communication, organizational and group processes, career education, learning styles, test construction and other skills which will improve the learning environment for students. Counseling, Career Development, Testing, and Consultation Services are located in the Administration building. The Learning Assistance Center is located in the Library.

### **DISABLED STUDENT SERVICES**

Composed mostly of disabled students, the Disabled Student Services program fosters awareness and insight concerning the situations, barriers, attitudes, and aspirations of disabled students. The Cal Poly community strives to make continued progress toward eliminating these barriers, attitudes, and situations. For more information please contact the Coordinator at the state-funded Disabled Student Services Office. Personal assistance is available to all disabled students to enable them to achieve educational and life goals.

### **EDUCATIONAL OPPORTUNITY PROGRAM**

The campus participates in the state-supported Educational Opportunity Program for residents of California. Designed to help low income and disadvantaged individuals to obtain a college education, it provides financial advice, tutoring, curriculum advisement, counseling, and career guidance services. California State University and Colleges entrance requirements may be waived for a limited number of high school graduates and community college transfers. Agencies authorized to nominate students for the program include high schools, community colleges, the Veterans Administration, and certain State agencies. For more information contact the Educational Opportunity Program Office.

### **FOOD SERVICES**

The food services on campus are operated by the Cal Poly Foundation and offer a variety of menus, and dining atmospheres to meet student needs and interests. Two campus dining halls provide cafeteria food service for meal plans or cash purchases. Vista Grande, which includes a full-service restaurant and an a la carte cafeteria, offers greater service for more formal occasions, visits with parents, and special celebrations. For quick nutritious a la carte items the Food Service also operates a snack bar, burger bar, old-fashioned ice cream parlours sandwich shop and vending areas. The variety offered ranges from fast foods and complete meals to formal catered banquets.

## MEALS PROGRAM

In addition to a la carte and vending services, meal ticket plans are available from the Foundation Business Office. See page 58 for meal plan requirement for resident students.

## FRATERNITIES AND SORORITIES

Nine national fraternities, seven national sororities, and two local fraternities have chapters at Cal Poly. The fraternities are: Alpha Epsilon Pi, Alpha Gamma Rho, Alpha Sigma, Alpha Tau Omicron, Alpha Upsilon, Delta Sigma Phi, Delta Tau, Lambda Chi Alpha, Omega Psi Phi, Phi Kappa Psi and Theta Chi. The sororities are: Alpha Chi Omega, Alpha Kappa Alpha, Alpha Phi, Gamma Phi Beta, Kappa Delta, Sigma Kappa and Zeta Tau Alpha.

Most of the fraternities and sororities own or lease buildings near the Cal Poly campus. Some fraternities provide lodging and meals for their members and pledges; the sororities house approximately ten members each. Students interested in seeking affiliation with a sorority or fraternity should contact either the Panhellenic Office (for sororities) or the Interfraternity Council (for fraternities).

## HEALTH SERVICES

The primary mission of the Cal Poly Health Center is to support the students' progress toward a diploma and to promote a positive outcome in the students' personal development. Minimizing time loss from illness and injury is helped by the well-qualified staff and excellent facilities, but increasing emphasis is on prevention of injuries and illnesses. Health education promotes positive changes in life style for life-long benefits. The Health Center provides outpatient services and an inpatient infirmary.

The health program is financed by the student through three plans; for complete coverage, each student is encouraged to participate in all three.

1. All students are entitled to Basic Outpatient Services. Prepayment for these services is included in Student Services Fees paid at registration. Outpatient care is offered Monday through Friday, year round, 8:00 a.m. to 5:00 p.m. and includes: physician and nursing services, specialty clinics, clinical laboratory and x-ray services. There is no charge for these services beyond student service fees.

2. An optional, augmented health fee (Health Card) entitles the student to services in the campus infirmary and 24-hour emergency care by Health Center nurses and physicians. Additional services under the Health Card plan are physical therapy, family planning services, preventive oral health and physical examinations required by the University, employers, Peace Corps, etc. All of these services are provided at no extra charge to students with a Health Card. The services also are available to students without a Health Card on a fee-for-service basis. However, these augmented services are not available during summer quarter.

3. For major medical/surgical problems which the Health Center cannot treat, each student is encouraged to be covered for major medical/surgical and emergency expenses through a supplemental major medical and hospital insurance policy, e.g., Blue Cross/Blue Shield, Kaiser, etc. A policy written specifically for Cal Poly students is available through a private company.

A Health Status Report on a form provided by Cal Poly is requested from each student.

## HOUSING SERVICES

### On-Campus Housing

On-campus residence hall facilities are available for 2,793 men and women. The residence hall environment is one in which "the individual counts as a person."

A stimulating intellectual and social living environment is an important part of the student's education. Study is encouraged in all the halls. All residence halls are either "quiet" or "semi-quiet" halls. Professional housing personnel work with residents in planning student programs which compliment the regular university educational programs. Programs such as intramural activities, discussion groups on current national issues and well-planned social events with fellow residents overcome feelings of isolation and loneliness, thus creating a residence hall environment conducive to strong personal growth and development.

New students who wish to live in the residence halls should request on-campus housing by returning their housing application to the Admissions Office. This is found in the "Notice of Space Reservation" booklet. Housing licenses are mailed to students according to a priority system which generally provides first priority to returning students with hardship situations and high priority to new students. Priority for housing is as follows:

1. Returning students who have resided in campus housing for only one quarter, that being the prior Spring
2. Returning students designated as hardship cases by the Dean of Students Office as follows:
  - a. physically handicapped
  - b. close relatives, e.g., a brother who has a younger brother coming to campus
  - c. economic situations verified by Financial Aid
  - d. educational reasons verified by academic departments
3. New undergraduate students
4. Returning students by class level as follows:
  - a. prior year freshmen
  - b. prior year sophomores
  - c. prior year others(Class level will be determined by units completed.)
5. If vacancies, all other students under 30 years of age, unless 30 and above are granted special permission by the Dean of Students.

Signed licenses, accompanied by the required payment, must be returned by the deadline stated in the license. Failure to comply with the license stipulations may result in loss of housing assignment.

**LIVING EXPENSES FOR STUDENTS LIVING IN  
CAMPUS RESIDENCE HALLS**

(Subject to Change)

**Room and Board**

Room per quarter, annual license required (double occupancy) .....	879.00
Board, annual (mandatory) (academic year) .....	870.00
Housing security deposit (payable prior to occupancy) .....	20.00
Room payable in advance. Arrangements to pay in installments may be made upon application for campus housing. A service fee of \$4.00 per quarter shall be charged for the right to make installment payments.	

Students furnish their own bed spreads and study lamps.

Two meal ticket plans are available. On-campus residence hall students must choose one of these two plans. The 19-meal plan provides for a maximum of 19 meals per week at a cost of \$900 prepaid for the academic year or three installments of \$305 each (includes a \$15 installment service charge). The 14-meal plan provides for a maximum of 14 meals per week at a cost of \$789 prepaid for the academic year or three installments of \$268 each. Students may change from one meal plan to the other only during a quarter break.

**Off-Campus Housing**

The Off-campus Housing Office maintains a listing service of available houses, apartments, rooms in private homes and mobile homes for rent. These listings are for San Luis Obispo and the north and south county areas. Included in the listings is information on rental rates, number of bedrooms, utilities included, location, person to contact, phone number, and any other special features. New listings are posted, rented ones removed, and others modified as soon as the information is made available to the office. The university does not inspect, approve, or disapprove any units offered for rent. The staff assists students with information about where and how to look for housing, things they should know about contracts, deposits, and general information about the community and university.



## PLACEMENT SERVICES

A centralized placement service is available to all students and alums of the university. The Placement Center and instructional departments work together in assisting students to obtain the most suitable employment consistent with their preparation and experience. Placement Center services focus on three student-centered objectives: to help clarify employment objectives and establish goals; to explore the full range of employment possibilities; and to present the student or graduate effectively as a candidate.

### BUSINESS, INDUSTRY, GOVERNMENT PLACEMENT

Every prospective graduate of the University should register with the Placement Center no later than the first quarter of the senior year. Through workshops and individual advisement students are guided through the development and implementation of a job search strategy. Employer contacts are developed on an individual basis as well as through an extensive on-campus recruiting/interview program.

### EDUCATIONAL PLACEMENT

Every candidate for a credential should register with the Placement Center one quarter prior to initial student teaching. Registration includes the preparation of personal data and the listing of references for the Educational Placement File. This file is maintained permanently by the Placement Center and is sent to school administrators when the candidate is seeking employment. Each candidate is also accorded the services of individual advisement, workshop participation, and campus interviews.

### STUDENT EMPLOYMENT

Both on-campus and off-campus part-time employment opportunities are available to students on a year-round basis. The University is highly committed to providing working opportunities for students as evidenced by the number of campus jobs available. Services are provided on a first-come, first-served basis. Students are encouraged to take summer employment in fields related to their major. The Placement Center receives many summer job listings from ranches and businesses throughout the western United States. Available to students are job listings and a limited number of on-campus interviews.

### RELATIONS WITH SCHOOLS

The Relations with Schools Office provides information about the university and its academic programs to educators, counselors, prospective applicants and their parents. It serves as a central point for inquiries received about the educational programs and requirements of the university. Staff are available to visit high schools and community colleges with information and materials on the instructional offerings. Anyone wishing to visit the campus should contact this office at (805) 546-2792 for appointments.

### FINANCIAL AID

The University has a variety of loan funds, scholarships, awards, and part-time employment opportunities designed to assist students financially. Students who must have assistance in order to complete their college work should read this section carefully. Additional current information may be obtained by writing to the Financial Aid Office for a copy of *Financial Aids Announcement*.

The application for Financial Aid is called the Student Aid Application for California (SAAC). It may be obtained from the Financial Aid Office, California high schools or colleges. Scholarship applications may be requested directly from the Financial Aid Office.

The deadline for filing the Student Aid Application for California (SAAC) is April 1. Scholarship applications are also due April 1. Scholarship applicants must also complete the SAAC which should be submitted to the College Scholarship Service, Box 70, Berkeley, California, 94701.

## TYPICAL STUDENT EXPENSES

Following is an estimate of typical expenses per quarter for the average California resident student living in campus residence halls. Non-resident students should be prepared to pay additional tuition fees. Of the total amount, the student should be prepared to pay from \$130 to \$180, depending upon his major, at the time of fall quarter registration and approximately the same amount at the time of registration for other quarters.\* Charges for room and board are payable in advance or in installments.

(All State fees are subject to change upon approval by the Board of Trustees of the California State University and Colleges.)

Associated Student fee .....	\$10.00
University Union fee .....	14.00
Health fee—optional (per quarter) .....	18.00
Student services fee (per quarter) .....	48.00
Facilities fee .....	2.00
Instructionally-Related Activities Fee .....	4.00
Room and board with mandatory annual 19-meal ticket.....	645.00
Books and supplies (estimated) .....	70.00†
Personal expenses and transportation .....	300.00
Estimated total per quarter (approximately 3 months).....	\$1,116.00

## SCHOLARSHIPS AND AWARDS

### General Information

Scholarships awarded by the University are available to both entering and enrolled students who meet the scholastic and financial need requirements of the University scholarship funds. These scholarships are made available from various sources, usually corporations, individuals, or interested groups outside the campus. Approximately 350 scholarships are awarded yearly.

### How to Apply

To be considered for a scholarship, a student or prospective student must complete a scholarship application. Students may secure an application from the Financial Aid Office. A Student Aid Application for California is required.

### Selection Criteria

Applicants are judged upon their need, scholastic ability, character and participation in school and community affairs. In addition, certain scholarships require special conditions concerning field of study, residence, and other similar factors.

Generally, students must have at least a "B" average to place high enough in the scholarship ratings to be granted an award. However, there are scholarships which are granted to students with a lesser grade average. In some cases need, special qualification, or a specific field of study will compensate for a lower grade average. It is recommended that a student apply if in doubt.

\* Students enrolling under the auspices of an agency supplying educational assistance should check in advance with the appropriate agency representative regarding payment of fees and/or costs.

† Beginning engineering and architecture students should be prepared to pay up to \$170 in their first quarter.

## GENERAL

### Freshman or Advanced Student Scholarships

Alan Pattee Scholarship  
 California Rural Rehabilitation Corporation  
 Educational Fund Scholarships \$600  
 R. W. Andrews Scholarship  
 William B. Turner Scholarships

### Freshman Scholarship

Lulu G. Bumphrey Scholarship \$350

### Advanced Student Scholarships

California Polytechnic State University  
 Wives' Club Scholarship \$200  
 Herbert E. Collins Scholarship  
 Green and Gold Barbeque Scholarship \$200  
 Julian A. McPhee Award \$450  
 Bing Crosby Youth Fund Scholarship  
 Ferini-Ardantz Scholarship \$450  
 Mercedes Berry Memorial Scholarship \$500



Mrs. Julian A. McPhee presents Julian A. McPhee Award.

**JULIAN A. MCPHEE AWARD**, (\$450), to an outstanding undergraduate student who has attended the University for at least six quarters as a full-time student. This award was established in memory of Julian A. McPhee, President of Cal Poly from 1933 to 1966. Students are nominated by each School of the University and will be requested to complete a scholarship application.

**ALAN PATTEE SCHOLARSHIPS.** Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, are not charged fees or tuition of any kind at any California State University or College, according to the Alan Pattee Scholarship Act *Education Code 68121*. Students qualifying for these benefits are known as Alan Pattee scholars. For further information contact the Financial Aid Office, which determines eligibility.

## AGRICULTURE AND NATURAL RESOURCES

### Freshman or Advanced Student Scholarships

California Cowbelles Scholarship \$200

Agnese Davey Scholarship \$300

### Freshman Scholarships

California State Grange Scholarships \$250

E.C. Loomis and Sons Scholarship \$100

San Luis Obispo County Cowbelles Scholarships \$250 & \$500

### Advanced Student Scholarships

Paul Belveal Memorial Scholarship

L. L. Bennion Scholarship \$250

California Association of Nurserymen,  
Central Chapter, Scholarship

California Association of Nurserymen,  
Peninsula Chapter, Scholarship

California Dairy Industries Association  
Scholarship \$600

California Fertilizer Association Soil  
Improvement Committee  
Scholarship \$500

Earl J. Cecil Educational Foundation  
Scholarships \$450 (2)

Wellington Davey Scholarship

Dorothy Bancroft Drasel Scholarship

Paul Ecke Ranch Scholarship \$100

Paul Etchechury Memorial Scholarship \$300

William Randolph Hearst Foundation Schol-  
arship \$500

Ray Hansen Memorial Scholarship \$600

Poultrymen's Cooperative Association  
Scholarship \$300

General Dillingham Produce Industry

Scholarship \$1,000

Los Lecheros Dairy Club Financial Scholar-  
ship \$200

Rancho Sante Fe Garden Club \$450

William (Ben) and Helen Holman Alumni  
Agriculture Scholarship

Kings River Prune and Apricot Scholarship  
\$250

Th. R. and Valley M. Knudsen Foundation  
Scholarship \$1,000

Leopold Edward Wrasse Scholarships \$600

Los Angeles County Fair Scholarship

Natural Resources Management Scholarship  
\$100

James F. Merson Memorial Scholarship

Harry Parker Memorial Scholarship

Rain For Rent, Inc. Irrigation Scholarship in  
Memorial of Paul Etchechury \$250

Rancho Soledad Nurseries Scholarship \$500

Florance G. Ray Memorial Scholarship \$500

Harry Rosedale Memorial Scholarship \$300

San Luis Obispo Lions Club/Food  
Industries Scholarship \$225

Santa Barbara County Horticulture Society  
Scholarship \$250 (2)

Tractor and Equipment Club of California  
Scholarship \$500

Eric C. Twist Memorial Scholarship \$500

Western Agricultural Chemicals Association  
Scholarship \$500

Western Growers Association Scholarships

## ARCHITECTURE AND ENVIRONMENTAL DESIGN

### Advanced Student Scholarships

Wallace W. Arendt Scholarship \$500

Bechtel Corporation Scholarship \$500

D. Stewart Kerr Architectural Scholarship  
Fund

Peter A. Lendrum Scholarship \$1000

Warren Ludvigsen Memorial Scholarship  
\$300

Professional Architect's Scholarship

(Kruger, Bensen, Ziemer Architects)  
\$400

Frederick Peter Young Scholarship \$150

California Portland Cement Company  
Scholarships \$1,000

Jay Jay Shapiro Scholarship \$150

Julia Morgan/Phoebe Hearst  
Architecture Scholarship \$3,000

## BUSINESS

### Freshman or Advanced Student Scholarships

Central Coast Chapter Society of

California Accountants' Accounting  
Scholarship \$250

Channel Counties CPA Society Scholarship  
\$250

H.S. Crocker Company-Roland Meyer  
Memorial Scholarship \$1,000

Frank and Norma Exter Scholarship \$350

Charles Wyndham Flanagan Scholarship  
\$100

Getty Oil Company Scholarship \$500

## COMMUNICATIVE ARTS AND HUMANITIES

### Freshman Scholarships

Janet Gardner Scholarship \$1,000

John B. Long Memorial Scholarship \$250

### Advanced Student Scholarships

H. S. Crocker Company—Roland Meyer  
Memorial Scholarship \$1,000

Catherine Truchan Memorial Scholarship

## ENGINEERING AND TECHNOLOGY

### Advanced Student Scholarships

Alcoa Foundation Scholarship \$750  
Alpac Scholarship \$350  
American Institute of Aeronautics and Astronautics, Vandenberg Section \$300  
American Society of Heating, Refrigeration and Air-Conditioning Engineers Scholarships Southern California Chapter  
Bechtel Corporation Scholarship \$500  
The Boeing Company Scholarship \$500  
Burroughs Corporation Scholarship \$500  
Food Machinery Corporation Scholarship  
Harold R. Frank—Applied Magnetism Corporation Scholarship \$500  
Getty Oil Company Scholarship \$1000  
Industrial Technology Scholarship and

Development Fund Scholarships  
Institute of Electrical & Electronics Engineers, Santa Barbara Section, Scholarship  
Institute of Traffic Engineers, Central California Section Scholarship \$100  
Ken Kirk Memorial/San Francisco Chapter of the American Society of Plumbing Engineers Scholarship \$250  
National Conference of Standards Laboratories Scholarships  
Charles S. Osborne, Jr. Scholarship \$100  
John W. Page Foundation Scholarship \$100  
Clarence Radius Memorial Scholarship \$350  
Raytheon Company Scholarship \$500  
Standard Oil Company of California Scholarship \$750

## HUMAN DEVELOPMENT AND EDUCATION

Freshman Scholarship  
San Luis Obispo County Cowbelles Scholarship \$250 & \$500

Advanced Student Scholarships  
Parent-Teachers Scholarship \$350 (3)

## SCIENCE AND MATHEMATICS

Freshman or Advanced Scholarships  
Applegarth Biology Scholarship  
Beta Beta Beta Biological Society Scholarship  
Burroughs Corporation Scholarship \$500  
Dr. Clyde P. Fisher Memorial Scholarship

Hatfield Memorial Award  
Robert E. Holmquist Memorial Scholarship  
Barbara Lee Lincoln Memorial Award  
Sierra Vista Hospital Volunteers Auxiliary Scholarship

## ATHLETICS

Freshman or Advanced Scholarships  
Robert A. Mott Scholarship \$100  
Jon R. Dana Memorial Scholarship

Cal Poly Aquatic Scholarships  
Musselman Wrestling Scholarships \$350

## OTHER SCHOLARSHIPS

In addition to the scholarships awarded by the University, many awards from various private donors and organizations are available to assist students in meeting University expenses. Interested students should make inquiries for such awards directly to the sponsoring organization or to the Financial Aid Office.

## LOANS

Loans are generally for education purposes only, with definite provisions for repayment. These loans are of four types, the National Direct Education Act loans, United Student Aid Fund, Guaranteed Loan, and the University long-term education loan. Also available are emergency loans of small amount, interest free for short-term period.

### NATIONAL DIRECT EDUCATION ACT LOAN

The National Direct Student Loan can provide up to \$2,500 per year with a maximum of \$5,000 to an eligible undergraduate. Loans are also available to eligible graduate students. Repayment of principal and interest (3% on unpaid balance) begins one year after the student leaves the University. There are cancellation provisions for teaching in designated areas, teaching the handicapped, or teaching in a Head Start Program. Applications for this program are due by April 1 of each year for the following college year.

## STUDENT LOAN FUNDS

Student loan funds are available to provide temporary assistance to eligible students. Loans from these funds are made for varying periods of time, according to regulations determined by a faculty committee and in conformance with conditions prescribed in the establishment of the particular loan fund. Applications may be obtained from the Financial Aid Office.

### Institutional Long-Term Loans

Educational long-term loans are granted to students who need them and are considered good risks. They are approved by a standing committee on the basis of written applications, recommendations, and interviews. Promissory notes signed by the borrower and a co-signer are required. Amounts of up to \$500 may be borrowed per academic year. Interest is charged on the unpaid balance beginning six months after the date of graduation or withdrawal from the university. Repayment of the loan begins one year after graduation or withdrawal. Contributions to the long-term loan fund are:

Jed S. Blake Memorial Loan Fund  
Herbert E. Collins Student Loan Fund  
1960 Football Memorial Loan Fund

Fred Kimball Loan Fund  
Norma Sullivan Memorial Loan Fund

### One-Year Loans

The university has additional funds for emergency loans. Up to \$200 can be borrowed from these funds during a school year. Repayment is required by the following September 1 with 6% interest charged on the unpaid balance.

Contributors to this fund include:

Agricultural Engineering Society Loan Fund  
Alpha Zeta Loan Fund  
Alumni Association Loan Fund  
American Society of Heating, Refrigeration and Air Conditioning Engineers Loan Fund  
American Welding Society Loan Fund  
Lamar Anderson Memorial Student Loan Fund  
Peter Bachino Memorial Loan Fund  
Baer-Beck Fund  
Edgar E. Bilodeau Loan Fund  
California Association of Refrigeration Service Engineers Loan Fund  
California Association of Soil Conservation Districts Loan Fund  
California Polytechnic Memorial Loan Fund  
California Retired Teacher's Loan Fund  
California Polytechnic State University Wives' Club Fund  
W.B. Camp Educational Loan Fund  
Logan S. Carter Loan Fund  
Margaret Chase Memorial Loan Fund  
Thomas Comer Memorial Loan Fund  
Harlan Diedrichsen Memorial Loan Fund  
Court Evergreen, Independent Order of Foresters Loan Fund  
Barbara Hammonds, Memorial Loan Fund

John Holley Memorial Loan Fund  
Ralph Hoover Loan Fund  
Horsehoeing and Animal Husbandry Loan Fund  
Industrial Technology Scholarship and Development Fund  
International Students Emergency Loan Fund  
Chris Jespersen Fund  
Anita Hathaway/KEMA Fund  
William Kirkpatrick Memorial Loan Fund  
Alfred M. Kretzmann, Jr. Memorial Loan Fund  
Lee Gird Levering Memorial Loan Fund  
Lynn T. Lobaugh Memorial Loan Fund  
William Mercer Memorial Loan Fund  
Roy E. Metz Memorial Loan Fund  
Ornamental Horticulture Emergency Loan Fund  
Rotary Club Fund  
San Fernando Valley Club, Printing House Craftsmen Loan Fund  
Sears Roebuck Foundation Loan Fund for Foreign Students  
George Sehlmeier Fund  
Student Architect Wives Club Loan Fund  
Telegram-Tribune Loan Fund  
Todd Farm Bureau Emergency Loan  
Wilder Memorial Loan Fund

### **University Emergency Loans**

Short-term loans in amounts up to \$50 can be borrowed quarterly with payment due by the end of the quarter.

### **FEDERAL INSURED LOAN PROGRAM**

This program enables students to borrow funds from banks and other lending institutions. Loans are processed by the University and approved by a cooperating lending agency. The FISL is a 7% interest loan. The federal government will pay the interest on the principal borrowed while the student is in school. Upon entering the repayment period, the student will assume the interest obligation at 7% per year on the unpaid balance. Deadlines vary according to the lending agency as do maximum amounts loaned.

### **SUPPLEMENTAL EDUCATIONAL OPPORTUNITY GRANT PROGRAM**

A grant-in-aid program intended to assist undergraduate students who, without substantial aid such as this, could not attend college. The aid must be matched by a National Direct Loan or similar aid. Educational Opportunity Grant applicants must submit a Student Aid Application for California.

### **BASIC EDUCATIONAL OPPORTUNITY GRANT PROGRAM**

This is a Federal aid program designed to provide financial assistance to those who need it to attend post-high school education institutions. The maximum award that may be received is \$1,600 minus the amount the student and family are expected to contribute toward the cost of his or her education.

### **LAW ENFORCEMENT EDUCATIONAL GRANT PROGRAM**

Grants for the mandatory fees required by the University are made available to in-service law enforcement officers through a Federal program. Applicants may enroll on a full- or part-time basis and must agree to serve in the employing agency for a period of at least two years following completion of their studies.

### **MERLE HAMBLY FUND PROGRAM**

A fund established by the California Polytechnic State University Student Wives Club provides for grants to assist the married student whose child has met with an accident or otherwise requires immediate medical care of an emergency nature.

### **STATE AID TO THE PHYSICALLY HANDICAPPED**

The State of California, through its Bureau of Vocational Rehabilitation, provides financial assistance to students who have physical disabilities. This assistance equals the necessary school expense and may include an additional amount to help cover the cost of living. Students who may be entitled to the assistance should apply to the State Bureau of Vocational Rehabilitation.

### **COLLEGE WORK STUDY PROGRAM**

The University is participating in the College Work Study Program which provides students who are eligible the opportunity of employment as set forth under the Economic Opportunity Act. Employment provisions under this program are parallel to those of other student employment on campus. Rates of pay vary depending on the job requirements and the skills of the worker. Student Aid Application for California is required. Information may be obtained from the Financial Aid Office.

# School of Agriculture and Natural Resources





# SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

Howard C. Brown, Dean  
John W. West, Associate Dean

The School of Agriculture and Natural Resources prepares students in the field of agriculture with the main objective of giving them a broad and full understanding of basic factors involved in production, management, processing, distribution, marketing, sales, and services in related business to make efficient operators and managers. While the school stresses production techniques and basic management to benefit those returning to the farm or entering employment in other agricultural fields, it also requires a core of basic science courses related to the major and general education courses.

This preparation also provides the sound basis necessary for the student desiring to become a teacher of agriculture in California's secondary schools and community colleges.

Curricula in the School of Agriculture and Natural Resources are arranged so that the student receives a maximum of production courses in the major field early in the program. The student who terminates formal education prior to graduation thus acquires some knowledge and experience. In addition, the student is able to determine in a short time whether or not the curriculum selected is appropriate to his or her skills and interests.

Furthermore, the early acquisition by the student of practical, "doing" types of activities provide an incentive to learn basic scientific explanations.

The courses offered in each agricultural curriculum may be grouped into four areas as follows:

1. Major agriculture—The required sequence of courses offered by the department in which the student expects to graduate. These courses constitute the core of specific preparation for the major field.
2. Related agriculture—Supporting courses in agriculture selected from closely allied fields. They supplement the major agriculture block.
3. Science and mathematics—Courses selected from scientific fields which provide basic biological, physical, and social science, and mathematical background and support for the agricultural blocks above.
4. Humanistic and social—Courses which provide cultural background for intelligent participation in a complex world society.

## RECOMMENDED PREPARATION

Admission to the School of Agriculture and Natural Resources requires high school graduation, with appropriate grades and aptitude test scores, but does not require that a specific pattern of courses be taken in high school. However, a student who anticipates enrolling in an agricultural major will find a strong background in mathematics and physical and biological sciences to be advantageous.

Attention is directed to the chart on the preceding page which summarizes the recommended community college preparation for agricultural major curricula. This chart should be studied and followed carefully in order to prevent loss of time in completing the degree program after transferring to Cal Poly.

## PROGRAMS

Curricula are offered in the following majors in the School of Agriculture and Natural Resources: agricultural engineering, agricultural management, agricultural science, animal science, crop science, dairy science, food science, fruit science, mechanized agriculture, natural resources management, ornamental horticulture, poultry industry, and soil science.

The Agriculture Education Department provides an additional program of courses required of prospective secondary agriculture teachers.

The Veterinary Science Department offers courses supportive of the animal science and dairy science majors.

The Animal Science Department offers a 12-week course in horseshoeing in the fall and spring quarters.

## MASTER OF SCIENCE IN AGRICULTURE

The School of Agriculture and Natural Resources offers a program of graduate study leading to the degree of Master of Science in Agriculture. This broadly-based program is designed to develop professional competencies for positions in agriculture and related industries, teaching, business, and government work which now require levels of preparation beyond the baccalaureate degree. Specializations are currently available in the areas of General Agricultural Sciences, International Agriculture, Mechanized Agriculture, and Soil Conservation.

### CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN GENERAL AGRICULTURAL SCIENCES

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>
Courses in area of specialization .....	24
The 24 units of 300, 400, or 500 series courses must be distributed among a minimum of three departments in the School of Agriculture and Natural Resources. Fifteen units must be 500 series. No more than 9 units may be approved in Ag 599, Thesis.	
Courses to be selected from 300, 400, or 500 series courses as approved by the student's graduate committee. Eight units must be 500 series. ....	21
	<u>45</u>

### CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN INTERNATIONAL AGRICULTURE

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>
Courses in the area of specialization:	
AM 515 International Agricultural Marketing .....	3
AM 516 Communication for Change in Developing Countries .....	3
AM 510 World Agricultural Development .....	3
Courses in agriculture in the 500 series as approved by the student's graduate committee, at least 8 units: .....	8
Courses in agriculture to be chosen from the 300 series or above .....	7
	<u>24</u>
Courses outside the area of specialization	
AgEd 580 Special Problems in Agricultural Education .....	3
PolSc 510 Administration in Developing Nations .....	3
Courses selected from the following:	
Geography, Political Science and History of one selected world regional area (Latin America, Africa south of the Sahara, North Africa and the Middle East, or Asia and the Far East), 300 or 400 series courses as approved by the student's graduate committee.	
The student must develop and demonstrate language competency as required by the graduate committee .....	9
Electives from 300, 400, and 500 series courses .....	6
	<u>45</u>

### CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN MECHANIZED AGRICULTURE

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>
Courses in the area of specialization:	
AE 521 Engineering of Agricultural Equipment .....	4
AE 522 Agricultural Process Engineering .....	4
AE 533 Advanced Irrigation System Design .....	4
AE 581 Graduate Seminar in Agricultural Engineering .....	3

Ag 599 Thesis, or approved courses .....	9
Courses other than in the area of specialization:	24
Courses to be selected from the 300-400-500 series outside the area of specialization and approved by the student's graduate committee. At least six units must be in 500 series courses .....	15
Electives from 300, 400, and 500 series courses .....	6
	45



### CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN SOIL CONSERVATION

(For University requirements see the *Graduate Studies Announcement*)

Courses in the area of specialization:	Units
NRM 502 Resource Conservation .....	3
SS 508 Conservation Legislation .....	3
SS 521 Soil Morphology .....	3
SS 581 Graduate Seminar in Soils .....	3
SS 582 Graduate Seminar in Land Management .....	3
Ag 599 Thesis, or approved courses .....	9
	24
Courses other than in the area of specialization:	
Courses to be selected from the 300-400-500 series outside the area of specialization and approved by the student's graduate committee. At least six units must be in 500 series courses .....	15
Electives from 300, 400, and 500 series courses .....	6
	45

### TECHNICAL CURRICULA IN AGRICULTURE

In keeping with the Universitywide policy of offering major courses which lead to occupational competency from the beginning of the first year of the four-year sequence, it is essential to provide opportunity for students who may find it impossible to complete four-year programs, to obtain as early as possible a concentration of production courses with a minimum of supporting material.

A technical two-year curriculum is available in each of the following agriculture areas: animal science, dairy husbandry and manufacturing, crop science, fruit science, food science, ornamental horticulture, and poultry industry. These curricula include a smaller number of units of related and general education courses than are included in the degree programs.

This permits the student to acquire the basic fundamentals in the major and a greater freedom of choice of subjects in agricultural production courses. A student not wishing to enroll in a degree curriculum will find that a two-year curriculum offers a maximum opportunity to select courses which will apply directly to an agricultural career. For admission requirements see "Requirements for Admission as an Undergraduate Student."

Upon completion of 98 selected units, a student may receive a technical certificate in the major field.

A student enrolled in the technical program will not be allowed to enroll for credit in any 300 or 400 series courses except when prior approval has been obtained by petition for special consideration.

The following is the two-year technical curriculum for animal science. Other majors follow a similar pattern. Detailed curriculum information is available from the Dean of the School and department heads.

Freshman	F	W	S
Feeds and Feeding (ASci 101) .....	4		
Market Beef Production (ASci 111) .....	3		
Elements of Swine Production (ASci 112) .....		3	
Elements of Sheep Production (ASci 113) .....			3
Agricultural Mechanics (AE 121 or 122) .....		2	
Agricultural Engineering elective .....			2
English Composition .....	3		
Agricultural Math (Math 102) .....		3	
Physical Education activity .....			1
* Agricultural Biology (Bio 099) .....		3	
Soils (SS 121) .....			4
† Electives .....	7	6	7
	17	17	17
Sophomores			
Applied Beef Cattle Management (ASci 241) .....	2		
Applied Swine Management (ASci 242) .....		2	
Applied Sheep Management (ASci 243) .....			2
Agricultural Engineering electives .....	4		
* Prin. of Livestock Hygiene and Sanitation (VS 099) .....		5	
Forage Crops (CrSc 123) .....			4
* Farm Records (AM 099) .....	4		
Health Education (PE 250) .....			2
* U.S. History and Government (Pol Sc 099) .....		3	
Agricultural Management electives .....	3		
† Electives .....	3	6	7
	16	16	15

A student enrolled in the technical program may not transfer to a degree program except by following the approved university procedure for such transfers.

The following specialization areas are available to two-year technical students in Animal Science: Beef Cattle Production, Horse Production, Feed Mill Operation. One of these may be selected with the approval of the adviser.

## AGRICULTURAL ENTERPRISE PROJECT FACILITIES

The School of Agriculture and Natural Resources utilizes the student enterprise program of the California Polytechnic State University Foundation to provide practical experience

\* These courses are taken in place of the required courses in the same subject matter fields listed in the degree curricula in the first two years and may not be used as credit toward a degree. VS 099 is replaced by CrSc 099 for plant majors.

All two-year technical students are required to take Math 102. Students in Mechanized Agriculture are required to take Math 102 and 103.

† 11 units of 100-200 level ASci, Dairy Sci, PI, FdSc, and VS courses must be included.

which supplements the regular production courses. This enterprise program leads to a fuller understanding of important production and managerial problems in agriculture.

The entire farm with its equipment, buildings, and livestock is available to students for their use in conducting a wide variety of agricultural enterprise projects.

The University Foundation has some of the best breeding flocks and herds of livestock in the State. In addition to the 150 registered Hereford, Angus and Shorthorn beef cattle, there is a 200-cow commercial beef herd which provides experience in typical range cattle management. All necessary equipment for beef cattle production—barns, dehorning and loading chutes, corrals, stock horses, etc.—is available.

The Foundation swine herd consists of two major breeds—Yorkshires and Hampshires. The facilities include a 10-unit farrowing house and outside lots and pastures for the brood sows. In addition there are 12 feeder units for student projects having a capacity of approximately 20 market hogs per unit. Student projects market between 400 and 500 market hogs each year.

The Foundation breeding flock of sheep is made up of two breeds—Hampshire and Suffolk. From 20 to 40 breeding ewes are maintained in each of the breeds, giving the students an opportunity of carrying on typical purebred breeding operations. Opportunities are offered for work with a typical commercial sheep flock of 300 ewes. Students also have the opportunity of learning shearing and care of wool as well as lamb production.

The dairy herd includes purebred Jerseys, Guernseys, and Holsteins. Equipment includes all the necessary facilities for feeding and milking, care of calves and bulls, artificial insemination, milk testing, bottling, separating, and creamery operations. Students conducting dairy projects carry out their operations on a separate grade A dairy.

The poultry flock consists of between 3,500 and 4,000 birds. The equipment includes a modern incubator, egg-handling facilities, brooders and brooder houses, pens for trap-nesting and pedigree work, and related devices. A student assistant and the students themselves care for every operation under the supervision of the department head.

The Ornamental Horticultural Department occupies a unit consisting of twelve greenhouses and six shade houses together with a sales unit and two large labs used for nursery instruction. Student projects are operated in all phases of nursery work. Equipment includes all of the essential machinery necessary for operation of a modern unit.

The Crop Science Department is well equipped with all types of machinery found on mechanized farms in California. All of the farming operations are carried on by the students under the supervision of the Crops and Farm Departments through project class work or paid student labor. Orchards, vineyards, crop land, fruit and vegetable packing facilities and marketing outlets are available for instructional purposes.

The Agricultural Engineering Department operating and servicing all of the mechanized equipment on the campus has many opportunities for students to learn practical farm machinery maintenance and repair. The major part of the maintenance work is handled by students under faculty supervision.

# AGRICULTURAL EDUCATION DEPARTMENT

Department Head, Larry P. Rathbun

Alan S. Damann

Leo Sankoff

Keith V. Smith

Joseph E. Sabol

The primary function of the Agricultural Education Department is to provide for the preparation of teachers of agriculture for the public secondary schools of California. Specialized pre-professional and professional courses are offered for undergraduates and graduate students.

Students interested in teaching agriculture may receive a B.S. degree in any of the agricultural science production or management fields. Course work toward the teaching credential should be started early in order most effectively to complete the total curriculum.

An Agricultural Science major has been developed which includes a credential preparation program providing for early field experience and undergraduate student teaching. Graduates with a degree in Agricultural Science obtain a concentration of preparation in Animal Production, Plant Production, Agricultural Supplies and Services, Agricultural Mechanics, Agricultural Products and Processing, Ornamental Horticultural or Agricultural Resources Management.

Student teaching may also become a part of the graduate program for agriculture majors. Candidates have five years in which to complete 45 quarter units of post graduate course work necessary for the "clear" teaching credential, after receiving the preliminary teaching credential.

Agricultural education courses may be used to fulfill twenty-four of the forty-five units required for the Master of Science in Agriculture degree with a specialization in General Agricultural Sciences. Detailed information may be obtained in the office of the Dean of the School of Agriculture and Natural Resources.

## CURRICULAR CONCENTRATIONS

### Animal Production

A selection of courses stressing principles and practices related to the economic use of resources in the production of livestock and poultry.

### Plant Production

A selection of courses stressing principles and practices related to the economic use of resources in the culture and production of agricultural plants.

### Agricultural Supplies and Services

A selection of courses which stresses providing the consumable supplies and services needed in the production phase of agriculture.

### Agricultural Mechanics

A selection of courses designed to develop knowledge and ability necessary to perform agricultural mechanical operations and processes.

### Agricultural Products and Processing

A selection of courses concerned with the principles and practices involved in the science and technology of agricultural products.

### Ornamental Horticulture

A selection of courses stressing the principles and practices involved with the culture of plants used for ornamental or esthetic purposes.

### Agricultural Resources Management

A selection of courses stressing the principles and practices involved in the conservation, multiple use or improvement of natural resources.

## CURRICULUM IN AGRICULTURAL SCIENCE

Freshman	F	W	S
General Animal Science (ASci 230) .....	4		
General Dairy Husbandry (DH 230) .....			4
Agronomic Production (CrCs 230/FrSc 230/VgSc 230) .....	4	4	
Agricultural Mechanics (AE 121 or 122) .....		2	
Agricultural Tractors and Equipment Skills (AE 141) .....			3
Introduction to Agricultural Education (AgEd 202) .....	2		
General Botany (Bot 121) .....		4	
General Zoology (Zoo 131) .....			4
Mathematics (Math 102/103 or 113/114) .....	3	3	
Freshman Composition (Engl 104) .....	3		
Electives and courses to complete major .....		4	4
	16	17	15
<b>Sophomore</b>			
Soils (SS 121) .....			4
Agricultural Business Sales and Service (AM 201) .....	3		
Ornamental Gardening (OH 230) .....		3	
General Poultry Production (PI 230) .....	3		
Manufacturing Processes (ETWT 144) .....			2
* Agricultural Mechanics (AE 335 or 339) .....	3		
F.F.A. Programs and Activities (AgEd 303) .....			2
Supervised Agricultural Experiences (AgEd 339) .....			2
General Chemistry (Chem 121, 122) .....	4	4	
General Psychology (Psy 202) .....			3
Economics (Econ 201 or 211) .....		3	
Principles of Speech (Sp 200) .....		3	
Electives and courses to complete major .....	3	4	3
	16	17	16
<b>Junior</b>			
Agricultural Marketing (AM 301) .....		3	
Farm Records (AM 321) .....			4
Drug Education (PE 305) .....		2	
Learning Process (Ed 335) .....	3		
Multicultural Education (Ed 301) .....	3		
** Natural Science .....	4		
American Government (PolSc 201) .....			3
Growth of American Democracy (Hist 204) .....	3		
The United States in World Affairs (Hist 205) .....		3	
** Literature or Philosophy .....		3	3
Advanced Composition (Engl 300) .....	3		
Agriculture/Agricultural Education elective .....			3
Agriculture courses to complete major .....	1	6	3
	17	17	16
<b>Senior</b>			
Senior Project (AgEd 461, 462) .....	2	2	
Instructional Processes in Agricultural Education (AgEd 438) .....	3		
Diagnosis, Prescription and Evaluation (Ed 436) .....	2		
Practicum or Seminar (AgEd 441 or AgEd 463) .....		2	
Field Experience in Reading Methods (Ed 434) .....	2		
Methods of Teaching Reading (Ed 435) .....		3	
** Humanities elective .....	3		
Health Education (PE 250) .....			2
Agriculture/Agricultural Education electives .....		6	15
Electives and courses to complete major .....	4	5	
	16	18	17

\* Students with Agricultural Mechanics Concentration take AE 335.

\*\* To be selected in accordance with the General Education requirements.

# AGRICULTURAL ENGINEERING DEPARTMENT

Department Head, Jack D. Wilson

James Bermann  
Charles M. Burt  
Edgar J. Carnegie  
Frank G. Coyes  
John E. Dunn

Larry J. Glass  
Robin R. Grinnell  
Lloyd H. Lamouria  
Willard H. Loper  
Glenn Rich  
Glenn W. Salo

Leo Sankoff  
Rollin D. Strohman  
Rodger E. Vierra  
James P. Webster  
Gary Weisenberger  
James B. Zetsche, Jr.

The Agricultural Engineering Department offers two programs leading to a Bachelor of Science degree: Agricultural Engineering and Mechanized Agriculture.

Two buildings containing eight laboratories and two classrooms, together with a large modern farm machinery and equipment building provide excellent facilities. A wide variety of tractors and farm machinery is available for class use and students are provided with ample opportunity for the application of mechanical and engineering know-how to practical production problems in using thousands of acres of university farms as a laboratory. Enterprise project activity is also encouraged.

Students are encouraged to participate in the student clubs of the department. The Agricultural Engineering Society is composed of Mechanized Agriculture and Agricultural Engineering majors and is involved in a broad range of activities and services including Homecoming, the tractor pull team, and Poly Royal displays. The student branch of the American Society of Agricultural Engineers offers an active program of professional and extra-curricular activity.

## AGRICULTURAL ENGINEERING MAJOR

Agricultural engineers provide the engineering necessary for the development of agriculture. The agricultural engineer represents the most general type of engineer, adept at utilizing electrical and mechanical energy sources and water resources and designing structural units. The curriculum features a unique combination of engineering and agricultural course work designed to prepare the graduate to assume a productive role in society.

Employment opportunities exist primarily in the design of: 1) water management systems, including those for irrigation, drainage, hydrology, flood control and soil conservation; 2) farm machinery; 3) food processing systems; and 4) agricultural structures. Manufacturing firms, consulting engineering firms, and government are the primary employers.

The curriculum is accredited by the Engineers' Council for Professional Development.

## MECHANIZED AGRICULTURE MAJOR

This major gives the student broad agricultural training with emphasis on the applied mechanical phases of agriculture. Business and management courses also are emphasized. Twenty-eight units of free electives enable the student to tailor his or her degree program in mechanized agriculture toward those emphasis areas which suit his or her career objectives. Emphasis areas include business, agricultural management, crop science, animal science, or industrial technology.

Career opportunities are available in sales and service of farm equipment and machinery, farm management, teaching vocational agriculture with an emphasis on agricultural mechanics, and management of machinery systems for a farm or ranch.

## CURRICULUM IN AGRICULTURAL ENGINEERING

Freshman	F	W	S
Agricultural Mechanics (AE 128) .....	3		
Power and Machinery (AE 143) .....		4	
Engineering Surveying (AE 237) .....			2
Manufacturing Processes (ETMP 144) .....	2		
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
Freshman Composition (Engl 104, 105) .....	3	3	
Applied Descriptive Geometry (ETME 141) .....		2	



	F	W	S
Engineering Drawing Systems (ETME 142) .....			2
Soils (SS 121) .....	4		
* Physical Education.....	1	1	1
General Chemistry (Chem 121, 122) .....		4	4
** Elective.....			4
	17	18	17
<b>Sophomore</b>			
Agricultural Structures Planning (AE 232) .....			3
Principles of Irrigation (AE 236) .....	4		
Economics (Econ 211) .....			3
Digital Computer Applications (Engr 251) .....			2
Life Science elective .....		3	
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
General Physics (Phys 131, 132, 133) .....	4	4	4
Engineering Mechanics (ME 211, 212) .....		3	4
Manufacturing Process (ETWT 144) .....	2		
** Elective.....	3	3	
	17	17	16
<b>Junior</b>			
Hydraulics (AE 312) .....	4		
Hydrology (AE 315) .....		3	
Off-the-road Locomotion (AE 326) .....			3
Irrigation Theory (AE 331) .....		3	
Engineering Properties of Agricultural Materials (AE 333) .....			3
Dynamic Measurement (AE 338) .....			3
Heat Transfer (EnvE 313) .....		3	
Electrical Circuit Theory (EE 201) .....	3		
Electric Circuits Laboratory (EE 261) .....	1		
Thermodynamics (ME 302) .....	3		
Strength of Materials (CE 208, 209) .....		3	3
American Government (Pol Sc 201) .....	3		
Statistical Analysis (Stat 321) .....	3		
* Humanities elective .....			3
* Literature or Philosophy elective.....		3	
Electives .....			3
	17	15	18
<b>Senior</b>			
Agricultural Systems Engineering (AE 403) .....			3
Irrigation Engineering (AE 414) .....			4
Equipment Engineering (AE 421, 422) .....	4	3	
Agricultural Structures Design (AE 433) .....	4		
Agricultural Process Engineering (AE 427) .....		3	
Senior Project (AE 461, 462) .....	2	2	
Undergraduate Seminar (AE 463) .....	2		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Engineering Economy (IE 414) .....	3		
* Literature or Philosophy .....			3

\* To be selected in accordance with the General Education requirements.

\*\* At least 4 of the elective units must be selected from courses in the School of Agriculture and Natural Resources.

	F	W	S
* Social Sciences .....			3
** Elective .....		6	
	15	17	16

### CURRICULUM IN MECHANIZED AGRICULTURE

#### Freshman

Agricultural Mechanics (AE 128) .....		3	
Agricultural Drafting (AE 133) .....	3		
Agricultural Tractors and Equipment Skills (AE 141) .....	3		
Power and Machinery (AE 143) .....			4
Algebra (Math 113) .....	3		
College Algebra (Math 114) .....		3	
Trigonometry (Math 115) .....			3
Freshman Composition (Engl 104, 105) .....	3	3	
Manufacturing Processes (ETMP 144, 145) .....	2	2	
Manufacturing Processes (ETWT 144) .....	2		
Fundamentals of Metallic Arc Welding (ETWT 155) .....			2
Plant production elective .....			4
Soils (SS 121) .....		4	
Animal production elective .....			4
* Physical Education .....	1	1	1
	17	16	18

#### Sophomore

Agricultural Business Sales and Services (AM 201) .....	3		
Basic Accounting (Actg 131) .....			3
Agricultural Building Construction (AE 231) .....	3		
Agricultural Electrification (AE 134) .....			3
Agricultural Power Transmission (AE 234) .....		3	
Agricultural Power (AE 335) .....		3	
Engineering Surveying (AE 237) .....	2		
Gasoline Engine Diagnosis (AE 341) .....			3
Computer Applications to Agriculture (AM 250) .....		3	
College Physics (Phys 121, 122, 123) .....	4	4	4
Life Science elective .....		3	
Principles of Speech (Sp 200) .....	3		
Electives .....			4
	15	16	17

#### Junior

Principles of Agricultural Machinery (AE 322) .....		4	
Agricultural Products Handling (AE 323) .....			3
Principles of Agricultural Electrification (AE 324) .....	4		
Irrigation (AE 340) .....			4
Project Analysis (AE 343) .....	4		
Agricultural Equipment Projects (AE 344) .....		3	
General Chemistry (Chem 121, 122) .....		4	4
General Psychology (Psy 202) .....		3	
Report Writing (Engl 218) .....	3		
Business Law Survey (Bus 201) .....			3
Economics (Econ 201 or 211) .....	3		
† Electives .....	3	3	3
	17	17	17

\* To be selected in accordance with the General Education requirements.

\*\* At least 4 of the elective units must be selected from courses in the School of Agriculture and Natural Resources.

† 8 units must be selected from courses in the School of Agriculture and Natural Resources.

Senior	F	W	S
Closed Circuit Hydraulics (AE 301).....	3		
Agricultural Building Planning (AE 432).....			4
Electrical and Electronic Controls for Agriculture (AE 425).....		3	
Senior Project (AE 461, 462).....	2	2	
Undergraduate Seminar (AE 463).....	2		
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
Principles of Engineering Economy (IE 403) or Agricultural Credit and Finance (AM 310).....	3		
* Literature or Philosophy.....		3	3
* Humanities electives.....	3		
† Electives.....		6	5
	16	17	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Agricultural Engineering and other subjects.

\* To be selected in accordance with the General Education requirements.

† 8 units must be selected from courses in the School of Agriculture and Natural Resources.



# AGRICULTURAL MANAGEMENT DEPARTMENT

Department Head: Edgar A. Hyer

Renny J. Avey  
Kathleen L. Benoit  
Roger H. Bishop  
Gary S. Caviglia  
Gaylord J. Chizek  
M. LeRoy Davis

Arthur C. Duarte  
Warren S. Farrell  
Douglas G. Genereux  
John J. Herlihy  
H. Clay Little  
Robert E. McCorkle

Nancy C. Morris  
John A. Rogalla  
David J. Schaffner  
Jack F. Scott  
Duane O. Seaberg  
Martin D. Vix

The Agricultural Management curriculum emphasizes training in management for careers in agriculture. The curriculum is based on a solid background in production agriculture which provides for depth and breadth in agricultural management techniques. The thrust of the program is to prepare young people for careers in the management and operations of farms as well as in the management procedures required by firms that supply the service to farms and by those engaged in processing, marketing, distribution and sales of farm products.

The Agricultural Management curriculum provides a choice of two options to meet the specialized needs of students: 1) Agricultural Business Management and 2) Farm Management. The courses required in these options are listed following the year by year presentation of the basic curriculum. Supporting courses include accounting, statistics, law, economics, as well as courses in general education areas of English, mathematics, history, political science and psychology.

Students are required to take a block of agricultural production courses which are closely related to obtaining a background in management techniques for agriculture.

Students can select courses in specific areas in addition to the two major directions of the program.

## CURRICULAR OPTIONS

### Agricultural Business Management

Career placement opportunities for graduates of this program involve management operations required by agribusiness firms providing supplies and service to farmers and by those firms engaged in marketing, distribution and sales of farm products. These careers include sales representatives for agricultural chemical organizations and fertilizer companies and may lead into more responsible management positions. Other careers are found in farm credit institutions, farm brokerage and property management firms, advertising, food chains, food processing, and agricultural county and district fairs.

### Farm Management

Career placement opportunities for graduates of this option include management of farms, ranches, or feedyards in family businesses or on large-scale farms. Graduates are provided with the specialization needed to analyze and manage farm operations. Careers in farm appraisal are also available to these graduates.

## CURRICULUM IN AGRICULTURAL MANAGEMENT

Freshman	F	W	S
Introduction to Agricultural Management (AM 101) .....	3		
Introduction to Agricultural Economics (AM 102) .....		3	
Mathematics (Math 113, 114) .....		3	3
English Composition (Engl 114) .....		4	
Physical Education.....	1	1	1
** Life Science with lab.....			4
Crop Science elective .....	4		
Animal, Dairy or Poultry Science elective .....			4
* Electives .....	8	5	4
	<u>16</u>	<u>16</u>	<u>16</u>

\*\* To be selected in accordance with General Education requirements.

\* Electives must include 15 units to be selected in agriculture with prefixes other than AM. Of these units, 9 must be 300-400 level courses.

Sophomore	F	W	S
Principles of Economics (Econ 211) .....	3		
Agricultural Economics (AM 212) .....		3	
Agricultural Economic Analysis (AM 213) .....			4
Principles of Accounting (Actg 221, 222) .....		4	4
Elementary Probability and Statistics (Stat 211) .....	3		
Statistical Methods (Stat 212) .....		3	
Computer Application to Agriculture (AM 250) .....			3
Report Writing (Engl 218) .....		3	
Soil Science elective .....	4		
Food Science or Agr. Engineering elective .....			3
* Electives and courses to complete the option .....	7	4	3
	17	17	17
Junior			
Agricultural Marketing (AM 301) .....	3		
Agricultural Cooperative Organization and Management (AM 302) ....		3	
Agricultural Credit and Finance (AM 310) .....	3		
Agricultural Policy (AM 312) .....		3	
Agricultural Management Research (AM 360) .....			3
General Chemistry (Chem 121, 122) .....	4	4	
Science elective (Life Science with lab or Chem 226) .....			4
** Literature and/or Philosophy .....	3		3
General Psychology (Psy 201 or Psy 202) .....			3
Principles of Speech (Sp 200) .....		3	
* Electives and courses to complete the option .....	4	4	4
	17	17	17
Senior			
*** Advanced AM elective .....			3
Agricultural Labor Relations and Personnel Management (AM 401) ..	4		
Business Law (Bus 207) .....		4	
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
** Humanities Electives .....			3
Senior Project (AM 461, 462) .....	2	2	
Undergraduate Seminar (AM 463) .....			2
* Electives and courses to complete the option .....	7	7	5
	16	16	16

\* Electives must include 15 units to be selected in agriculture with prefixes other than AM. Of these units, 9 must be 300-400 level courses.

\*\* To be selected in accordance with General Education requirements.

\*\*\* To be selected from any 300-400 nonrequired AM course.

## AGRICULTURAL BUSINESS MANAGEMENT OPTION

(Add Courses Below to Basic Curriculum)

### Sophomore

AM 201 Agricultural Business Sales and Service ..... (3)

AM 203 Agricultural Business Organization ..... (3)

### Junior

AM 322 Principles of Farm Management ..... (4)

AM 323 Agricultural Business Managerial Acctg. .... (4)

AM 324 Agricultural Property Management ..... (4)

### Senior

AM 404 Agricultural Marketing Management ..... (3)

AM 405 Agricultural Marketing Research Methods ..... (3)

AM 406 Agricultural Business Communication ..... (3)

AM 421 Agricultural Business Operations Analysis ..... (4)

## FARM MANAGEMENT OPTION

(Add Courses Below to Basic Curriculum)

### Sophomore

AM 305 Agricultural Resources ..... (3)

AM 322 Principles of Farm Management ..... (4)

### Junior

AM 324 Agricultural Property Management ..... (4)

AM 326 Farm Appraisal ..... (4)

AM 413 Crop Management Problems .. (3)

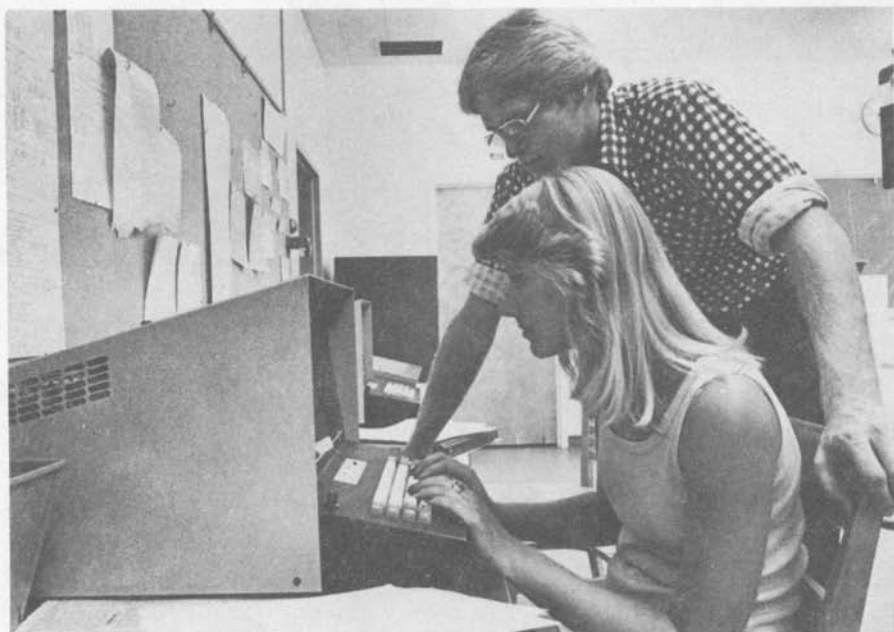
### Senior

AM 415 or 416 Livestock or Dairy Management Problems..... (3)

AM 431 Large Farm Accounting ..... (4)

AM 433 Agricultural Price Analysis .... (3)

AM 435 Linear Programming in Agriculture ..... (3)



## ANIMAL SCIENCE DEPARTMENT

Department Head, Richard F. Johnson

Russell K. Anderson  
Gene A. Armstrong  
Richard J. Birkett  
Colleen A. Childers  
Norman R. Eggen  
James R. Flanagan  
Frank W. Fox, Jr.

William R. Gibford  
Robert E. Hadley  
Michael H. Hall  
Roy M. Harris  
Robert D. Hooks  
James W. Jacobs

Lyle G. McNeal  
Robert T. Rutherford  
Kenneth C. Scotto  
Noel M. Shutt  
John V. Stechman  
Robert R. Wheeler

The objective of the Animal Science Department is to educate men and women for the occupation of farming where beef cattle, horses, sheep, and swine enterprises are an important part of the industry. The majority of graduates from the department are engaged in the livestock and farming business or are employed as ranch workers or managers.

Livestock feeding yards, feed mills, auction sales companies, meat packers, commission firms, and other organizations servicing the livestock industry are sources of employment for graduates. Other employment fields include agricultural teaching, agricultural extension work, agricultural research in the areas of animal nutrition, genetics, and reproductive physiology. The department allows wide latitude in the selection of elective courses so that students may pursue a secondary emphasis area or broaden the cultural base of their total college education.

The educational approach of the Animal Science Department is to provide students with instruction in theory and application of all phases of livestock production and range management. To this end the department maintains purebred and commercial instructional herds of the chief meat animal species, and a broodmare band of Thoroughbreds and Quarter Horses. The University herds and flocks are extensively used for laboratory and applied studies of management, feeding, breeding, and marketing techniques and procedures.

The student is encouraged to augment classroom and laboratory instruction through participation in the varied enterprise programs operated by the California Polytechnic State University Foundation. Through these programs large numbers of student-owned beef cattle, sheep and hogs are fed and marketed each year. Provision is also made to give the students an opportunity to own and manage, in partnership with the Foundation, a commercial cow herd and a prototype range band of ewes.

Instruction in the department also encompasses a diversified cocurricular program including three special interest clubs and the sponsorship of championship-calibre national intercollegiate teams in rodeo, livestock judging, and horse showing.

### CURRICULUM IN ANIMAL SCIENCE

Freshman	F	W	S
Feeds and Feeding (ASci 101) .....	4		
Market Beef Production (ASci 111) .....		3	
Elements of Swine Production (ASci 112) .....	3		
Elements of Sheep Production (ASci 113) .....			3
Agricultural Mechanics (AE 121 or 122) .....	2		
Freshman Composition (Engl 104) .....	3		
Report Writing (Engl 218) .....		3	
Mathematics (Math 102, 114) .....	3	3	
Physical Education activity .....	1	1	1
General Zoology (Zoo 131, 132) .....		4	4
Applied Beef Cattle Management (ASci 241) .....		2	
Applied Swine Management (ASci 242) .....	2		
Applied Sheep Management (ASci 243) .....			2
Library Instruction (Lib 101) .....			1
Principles of Speech (Sp 200) .....			3
Electives .....			3
	18	16	17

Sophomore	F	W	S
† Animal Science electives .....	4	3	
Agricultural Engineering electives .....	2	2	
Anatomy and Physiology (VS 123) .....		3	
Soil Science (SS 121) .....			4
General Chemistry (Chem 121, 122) .....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
General Bacteriology (Bact 221) .....	4		
General Botany (Bot 121) .....		4	
Forage Crops (CrSc 123) .....			4
Meats (Fd Sc 210) .....			3
Electives .....	2		2
	16	16	17
Junior			
Applied Animal Nutrition (ASci 302) .....		3	
Animal Hygiene (VS 302) .....	3		
Animal Parasitology (VS 203) .....		3	
† Animal Science electives .....			4
American Government (Pol Sc 201) .....	3		
General Psychology (Psy 202) .....			3
Genetics (Bio 303) .....		3	
Economics (Econ 201) .....	3		
Farm Records (AM 321) .....		4	
Farm Management (AM 322) .....			4
Biochemistry (Chem 328) .....			4
Business elective .....	3		
Electives .....	4	3	2
	16	16	17
Senior			
Animal Breeding (ASci 304) .....		3	
Reproductive Physiology (ASci 401) .....	4		
Animal Nutrition (ASci 402) .....		4	
Senior Project (ASci 461, 462) .....	2		2
Undergraduate Seminar (ASci 463) .....		2	
• Literature/Philosophy .....	3	3	
• Humanities elective .....			3
U.S. in World Affairs (Hist 205) .....			3
Growth of American Democracy (Hist 204) .....	3		
† Animal Science electives .....	2	1	6
Agricultural Management elective (300–400 level) .....		3	
Electives .....	3		2
	17	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Animal Science and other subjects.

† 20 units to be selected from courses in ASci, DH, Fd Sc, PI, VS. 13 units to be 200–400 level; at least 7 units must be at the 300–400 level.

• To be selected in accordance with the General Education requirements.



## CROP SCIENCE DEPARTMENT

Department Head, Corwin M. Johnson

Charles B. Atlee  
A. Charles Crabb  
H. Paul Fountain  
Alan L. Foutz  
Gregory L. Ganick

George G. Gowgani  
Louis W. Harper  
Robert J. McNeil  
Gene P. Offermann  
John C. Phillips

Howard Rhoads  
Frank P. Thrasher  
Gordon L. Van De Vanter  
Ralph M. Vorhies  
David L. Warfield

Two major curricula are offered by the Crop Science Department and are designed to prepare students for field, fruit, or vegetable crop production and for employment in related service areas.

Graduates in Crop Science and Fruit Science have attained responsible positions in agro-nomic and horticultural production, teaching, research, extension, quality control and inspection, and sales and service areas. Opportunities for employment in private industry and governmental sectors are available for those with practical knowledge of agricultural skills and techniques and a good background in the sciences and humanities.

The Department has 30 acres of productive citrus, avocados, grapes, deciduous orchard, and berries with over 100 varieties represented. Additional nonbearing acreage for instructional use exists and new plantings are under way. About 300 acres are devoted to student production enterprises in field and vegetable crops. An additional 200 acres of campus farm crop land provide opportunities to gain experience through part-time employment. All departmental majors are encouraged to gain experience and earn income by participation in the project enterprise program or by working for the campus farm.

The technological phases of instruction are enhanced by packing and grading equipment, seed processing equipment, and specialized laboratory equipment for the study of various crops. Field trips supplement instruction for crops not common to the San Luis Obispo area.

Students interested in the two-year technical certificate should refer to the School of Agriculture and Natural Resources introductory statement. The department head can supply additional information.

### CROP SCIENCE MAJOR

A student in the Crop Science major may elect to specialize in Agronomy, Plant Protection, or Vegetable Science in the junior and senior years. Employment opportunities for the students graduating in the Crop Science major include private or corporate crop production and management, sales and service, positions with commercial pest control firms, government regulatory agencies, and agriculture related organizations, and as agronomists and horticulturists with government or industry.

### FRUIT SCIENCE MAJOR

The Fruit Science Major qualifies graduates for orchard or vineyard management or for related employment for packers or canners, fruit inspection, or plant protection. Instruction includes deciduous fruits, nut crops, citrus, avocados, grapes, berries, tropical and sub-tropical fruits, and minor fruit species. Students may elect to specialize in Fruit Production, and Plant Protection in the junior and senior years.

### CURRICULUM IN CROP SCIENCE

Freshman	F	W	S
Introduction to Crop Science (CrSc 131) .....	4		
Grain Crops (CrSc 132) .....		4	
Row Crops (CrSc 133) .....			4
Agricultural Engineering electives .....	4		4
General Botany (Bot 121, 122 or 123) .....	4	4	
Freshman Composition (Engl 104, 105 or 218) .....		3	3

	F	W	S
Library Instruction (Lib 101) .....		1	
* Mathematics (Math 102, 103) .....	3	3	
Health Education (PE 250) .....	2		
Physical Education activity .....		1	
Electives .....		1	6
	17	17	17
<b>Sophomore</b>			
Weed Control (CrSc 221) .....	4		
Commercial Seed Production and Processing (CrSc 231) .....		4	
Vegetable Crops Production (VgSc 232) .....			4
General Chemistry (Chem 121, 122) .....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
Soils (SS 121) .....	4		
Soil Management (SS 122) .....		4	
Fertilizers (SS 221) .....			4
Principles of Speech (Sp 200) .....			3
General Psychology (Psy 202) .....	3		
Economics (Econ 201 or 211) .....		3	
Electives .....	2	2	2
	17	17	17
<b>Junior</b>			
General Bacteriology (Bact 221) .....	4		
Experimental Techniques and Analysis (CrSc 411) .....		4	
Farm Records (AM 321) .....	4		
†† Management elective .....		4	
Biochemistry (Chem 328) .....	4		
California Fruit Growing (FrSc 230) .....			4
Plant Pathology (Bot 323) .....			4
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
# Electives .....	2	4	6
	17	15	17
<b>Senior</b>			
Plant Breeding (CrSc 304) .....			4
Senior Project (CrSc 461, 462) .....	2	2	
Undergraduate Seminar (CrSc 463) .....			2
Genetics (Bio 303) .....	3		
†† Management elective .....		3	
Applied Insect Pest Management (CrSc 311) .....	4		
** Literature/Philosophy .....	3	3	
** Humanities elective .....			3
# Electives .....	4	8	6
	16	16	15

## CURRICULUM IN FRUIT SCIENCE

<b>Freshman</b>			
Pomology (FrSc 131, 132, 133) .....	4	4	4
* Mathematics (Math 102, 103) .....	3	3	
Agricultural Engineering electives .....	2		4

\* Math 113 may be substituted for Math 102 and 103 with adviser approval.

†† To be selected from any 300-400 series course in AM.

# At least 12 units to be selected with the approval of the adviser from 300-400 series courses.

\*\* To be selected in accordance with the General Education requirements.

	F	W	S
Freshman Composition (Engl 104, 105 or 218) .....	3	3	
Health Education (PE 250) .....		2	
General Botany (Bot 121, 122 or 123) .....	4	4	
Physical Education activity .....		1	
# Electives .....			8
Library Instruction (Lib 101) .....			1
	16	17	17
<b>Sophomore</b>			
Viticulture (FrSc 231) .....	4		
Fruit Plant Propagation (FrSc 232) .....		4	
General Chemistry (Chem 121, 122) .....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
Soils (SS 121) .....	4		
Soil Management (SS 122) .....		4	
Plant Pathology (Bot 323) .....			4
Weed Control (CrSc 221) .....			4
Principles of Speech (Sp 200) .....	3		
Agricultural Engineering electives .....	2		
Economics (Econ 201 or 211) .....		3	
# Electives .....		2	5
	17	17	17
<b>Junior</b>			
Fruit Production (FrSc 331 or 332) .....		4	
General Bacteriology (Bact 221) .....		4	
Applied Insect Pest Management (CrSc 311) .....	4		
Experimental Techniques and Analysis (CrSc 411) .....			4
Biochemistry (Chem 328) .....		4	
Genetics (Bio 303) .....	3		
Fertilizers (SS 221) .....			4
Farm Records (AM 321) .....	4		
General Psychology (Psy 202) .....	3		
# Electives .....	3	3	9
	17	15	17
<b>Senior</b>			
Advanced Pomology (FrSc 421) .....	3		
Plant Breeding (CrSc 304) .....	4		
Senior Project (CrSc 461, 462) .....	2	2	
Undergraduate Seminar (CrSc 463) .....			2
Orchard Management (FrSc 436) .....			4
General Field Crops (CrSc 230) .....		4	
** Management Elective .....			3
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
†† Literature/Philosophy .....	3	3	
†† Humanities elective .....			3
# Electives .....	1	4	1
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Crop Science, Fruit Science, Vegetable Science and other subjects.

# At least 12 units to be selected with the approval of the adviser from 300-400 series courses.

\*\* To be selected from any 300-400 series course in AM.

†† To be selected in accordance with the General Education requirements.

# DAIRY SCIENCE DEPARTMENT

Department Head, Eugene E. Starkey

Leslie S. Ferreira  
Timothy J. LaSalle

Carl F. Moy  
Gary D. Reif

Herman E. Rickard

## DAIRY SCIENCE MAJOR

The dairy curriculum is designed to prepare students for employment in the various phases of the dairy industry, including husbandry and manufacturing, as well as the related and allied fields. The basic curriculum is arranged to serve all students within the major with further courses included in the two options of husbandry and manufacturing to provide depth of instruction in either field.

The curriculum provides adequate elective units under either option for students to select additional courses in the sciences, business, education, or other areas of their choice to prepare them for advanced degrees in the field, teaching, or the business world of the dairy industry. Recommendations in these various areas will be given by faculty advisers.

Excellent facilities are provided for students selecting either of the options. The dairy herd includes purebred Jerseys, Guernseys, and Holsteins, located on a well-planned unit, where feeding, milking, calf raising, artificial insemination, and management are carried out. The campus creamery is a new and modern plant, well equipped with modern processing equipment. Students are employed on a part-time basis to work in both the production and processing areas. A separate dairy located on campus provides an opportunity for students with dairy projects. This farm accommodates 80-100 head of project cattle owned and cared for by students. There are two, 6-unit dormitories at this project farm.

## CURRICULAR OPTIONS

### Husbandry

The Dairy Husbandry Option emphasizes the preparation of students in production and management areas of the industry, including the selection, management, feeding and breeding of dairy cattle, and efficient, economical milk production.

### Manufacturing

The Dairy Manufacturing Option emphasizes preparation for participation in the processing and distribution field, including sales, quality control, field work and dairy inspection.

## CURRICULUM IN DAIRY SCIENCE

Freshman	F	W	S
Elements of Dairying (DH 121) .....	4		
Dairy Feeds and Feeding (DH 101) .....	2		
Feeding Dairy Cattle (DH 102) .....		2	
Market Milk (DM 133) .....			4
Freshman Composition (Engl 104, 105) .....	3	3	
Mathematics electives .....		3	3
General Zoology (Zoo 131) .....		4	
General Botany (Bot 121) .....	4		
Health Education (PE 250) .....			2
Physical Education activity .....		1	
Electives and courses to complete major .....	4	4	7
	17	17	16
Sophomore			
Milk Production (DH 221) .....	4		
Dairy Foods Evaluation (DM 233) .....			2
Economics (Econ 201 or 211) .....		3	
Principles of Speech (Sp 200) .....			3
* Literature or Philosophy .....	3	3	

\* To be selected in accordance with the General Education requirements.

	F	W	S
* Humanities elective .....			3
General Bacteriology (Bact 221) .....	4		
General Psychology (Psy 202) .....			3
Electives and courses to complete major .....	<u>6</u>	<u>11</u>	<u>6</u>
	17	17	17
<b>Junior</b>			
Dairy Inspection (DM 332) .....			3
Dairy and Poultry Product Merchandising (DM 202) .....		3	
General Chemistry (Chem 121, 122) .....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
Report Writing (Engl 218) .....			3
American Government (Pol Sc 201) .....	3		
Electives and courses to complete major .....	<u>10</u>	<u>9</u>	<u>6</u>
	17	16	16
<b>Senior</b>			
Senior Project (DH 461, 462) .....	2	2	
Undergraduate Seminar (DH 463) .....			2
Biochemistry (Chem 328) .....	4		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Computer Science elective .....		3	
Electives and courses to complete major .....	<u>10</u>	<u>8</u>	<u>11</u>
	16	16	16

### HUSBANDRY OPTION

(ADD COURSES BELOW TO BASIC CURRICULUM)

<b>Freshman</b>		<b>Junior</b>	
DH 142	Dairy Cattle Selection ..... (2)	DH 301	Advanced Dairy Cattle Feeding..... (2)
SS 121	Soils ..... (4)	DH 323	Breeds, Pedigrees and Management ..... (4)
<b>Sophomore</b>		Bio 303	Genetics..... (3)
DH 222	Commercial Dairy Herd Management..... (4)	AM 321	Farm Records ..... (4)
VS 123	Anatomy and Physiology ..... (3)	<b>Senior</b>	
VS 302	Animal Hygiene..... (3)	DH 422	Breed and Selection of Dairy Cattle ..... (4)
		ASci 402	Animal Nutrition ..... (4)
		AM 212	Agricultural Economics ..... (3)

### MANUFACTURING OPTION

(ADD COURSES BELOW TO BASIC CURRICULUM)

<b>Freshman</b>		<b>Junior</b>	
DM 132	Frozen Dairy Foods..... (4)	DM 331	Condensed and Dry Milk..... (4)
<b>Sophomore</b>			Management elective ..... (3)
DM 334	Cheese Making ..... (4)	DM 326	Fermented Dairy Foods ..... (3)
DM 336	Butter and Dairy Spreads .... (4)	Actg 131-2	Basic Accounting..... (6)
Bact 322	Dairy Bacteriology ..... (4)	<b>Senior</b>	
		DM 431	Dairy Plant Management..... (4)
		DM 433	Dairy Equipment and Systems ..... (4)

\* To be selected in accordance with the General Education requirements.

# FOOD SCIENCE DEPARTMENT

Department Head, Robert D. Vance

Thomas M. Lukes  
Thomas O. Meyer

O. R. Noyes  
F. Raymond Steele

Mary Y. Wang  
Rudy A. Wooten

The Food Science curriculum is designed to prepare students for employment in the various phases of the food industry. Instruction qualifies students for careers in production, quality control, food technology, marketing, and management.

The curriculum provides applied knowledge of the industry that will enable the graduate to accomplish production and management jobs connected with operations of the industry from field to market. Skills acquired in the operations aspects of the industry are coordinated with studies in science, business, and humanities.

The departmental laboratories include complete facilities for small scale commercial production of canned, frozen, dehydrated and concentrated fruit and vegetable products. Meats laboratories provide for complete processing of meat including slaughtering, cutting, curing, smoking and sausage manufacture.

Employment opportunities for graduates are excellent.

## CURRICULUM IN FOOD SCIENCE

Freshman	F	W	S
Survey of Food Industry (FdSc 101) .....	2		
Introductory Food Engineering (FdSc 122) .....		4	
Elements of Food Preservation (FdSc 123) .....	3		
Meats (FdSc 210 or 209) .....			3
Freshman Composition (Engl 104) .....	3		
Report Writing (Engl 218) .....		3	
American Government (PolSc 201) .....		3	
** Humanities elective .....			3
Mathematics (Math 113) .....	3		
Mathematics elective .....		3	
Physical Education activity .....	1	1	1
General Chemistry (Chem 121, 122) .....		4	4
Physics (Phys 104) .....			4
Animal Science elective .....	4		
Library (Lib 101) .....			1
	16	18	16
Sophomore			
Unit Processing Operations (FdSc 221, 222, 223) .....	3	3	3
Processed Food Inspection (FdSc 233) .....		3	
General Bacteriology (Bact 221) .....			4
Survey of Organic Chemistry (Chem 226) .....	4		
Principles of Speech (Sp 200) .....	3		
Biochemistry (Chem 328) .....		4	
Economics (Econ 201 or 211) .....		3	
General Psychology (Psy 202) .....			3
Industrial Relations (Mgt 313) .....		3	
Plant Science elective .....	4		
Nutrition (HE 210) .....	3		
Business elective .....			3
* Electives .....			4
	17	16	17

\*\* To be selected in accordance with the General Education requirements.

\* At least 12 of the elective units must be chosen with adviser's approval.

Junior	F	W	S
Food Quality Control (FdSc 321) .....	3		
Statistical Quality Control (FdSc 332) .....			3
Packaging (FdSc 336) .....		3	
Sanitation and Waste Disposal (FdSc 331) .....		3	
Sausage, Smoked and Canned Meat (FdSc 338) .....			3
Wines and Fermented Foods (FdSc 341) .....			3
Food Microbiology (Bact 421) .....	4		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Business elective .....	3		
* Electives .....	7	7	4
	17	16	16
Senior			
Advanced Food Processing (FdSc 421) .....	3		
Food Composition Science (FdSc 422) .....		3	
Food Evaluation (FdSc 425) .....			3
Advanced Meats (FdSc 431) .....	3		
Food Processing Management (FdSc 433) .....			3
Senior Project (FdSc 461, 462) .....	2	2	
Undergraduate Seminar (FdSc 463) .....		2	
** Literature or Philosophy .....	3		3
* Electives .....	6	9	7
	17	16	16

\*\* To be selected in accordance with the General Education requirements.

\* At least 12 of the elective units must be chosen with adviser's approval.



# NATURAL RESOURCES MANAGEMENT DEPARTMENT

Department Head, Marvin J. Whalls

Jack E. Bedwell  
Michael T. Hanson

John H. Harris  
Anthony E. Knable  
Walter R. Mark

Ralph E. Monteen  
Norman H. Pillsbury  
Gary J. San Julian

Natural resources are vital to the well-being of the nation. Increasing utilization of natural resources for economic uses and outdoor recreation is reflected in a demand for graduates prepared to assume positions of major responsibility. The Natural Resources Management Department prepares students for careers in the management and protection of our natural resources: water, forage, forests, fish and wildlife, wildlands, and recreational lands.

The basic curriculum in natural resources management provides courses in the foundation disciplines of agriculture, humanities, mathematics, and the natural, physical and social sciences. In addition to the basic curriculum, each student of natural resources management is required to complete a concentration of courses in a field of specialization. Pre-graduation employment in a natural resources area reinforces classroom and laboratory experiences, and enhances opportunities for post-graduate employment. Cal Poly cooperates with employers to maximize pre-graduation student employment.

Students are awarded the degree of Bachelor of Science upon completion of the program.

Graduates enter employment with federal agencies such as Forest Service, Park Service, and Bureau of Land Management; state agencies such as Natural Resources, Parks and Recreation, and Fish and Game; local agencies such as Park Authorities, Regional Forests and County Parks; and private industry such as lumber companies, utility companies, hunting preserves, and rural recreational enterprises. Qualified graduates are prepared to pursue graduate studies in most universities.

The departmental facilities provide opportunity for development of skills necessary for natural resources management. Field practices utilize special campus sites and nearby public and private resource areas.

## CURRICULAR CONCENTRATIONS

### Environmental Services

The environmental services concentration prepares students for employment as environmental analysts in the emerging fields of resource planning, environmental protection, and quality control of wildlands, waters and wildlife habitat.

### Fishery and Wildlife Management

The fishery and wildlife management concentration prepares students for employment in the fish and wildlife areas of law enforcement, management, and production.

### Forest Resources Management

The forest resources management concentration prepares students for employment in forestry. The curriculum provides broad training in both wildland and urban forestry. The Natural Resources Management Department has affiliate status with the Society of American Foresters.

### Parks and Recreation

The parks and recreation concentration prepares students for employment in the planning, development, interpretation, and management of governmental and private resource-based parks and other recreational lands.

## CURRICULUM IN NATURAL RESOURCES MANAGEMENT

Freshman	F	W	S
Introduction to Parks and Recreation (NRM 112) .....		3	
Introduction to Fisheries and Wildlife Management (NRM 120) .....			3
Forest Resources (NRM 130) .....	3		
Soils (SS 121) .....			4
General Botany (Bot 121) .....		4	



	F	W	S
Introductory Plant Taxonomy (Bot 123).....			4
General Zoology (Zoo 131).....	4		
Mathematics (Math 114, 115) .....	3	3	
English Composition (Engl 114, 115) .....	4	4	
Health Education (PE 250).....			2
Physical Education activity .....	1		
* Major/support courses .....	2	3	3
	17	17	16
<b>Sophomore</b>			
Fortran Programming (CSc 101).....		2	
Statistical Methods (Stat 211, 212) .....	3	3	
General Chemistry (Chem 121, 122).....		4	4
College Physics (Phys 121) .....			4
Physical Geology (Geol 201) .....	3		
Principles of Speech (Sp 200) .....	3		
Literature/Philosophy.....		3	
* Major/support courses .....	5	4	9
Electives .....	3		
	17	16	17
<b>Junior</b>			
Natural Resources Policy (NRM 302) .....	3		
Ecology of Resource Areas (NRM 304).....		4	
Principles of Economics (Econ 211) .....	3		
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204) .....		3	
The United States in World Affair (Hist 205).....			3
Humanities (elective) .....		3	
Literature/Philosophy.....			3
* Major/support courses .....	4		4
* Concentration .....	3	7	4
Electives .....			3
	16	17	17
<b>Senior</b>			
Applied Resource Economics (NRM 401) .....		3	
Watershed Management (NRM 440) .....	4		
Natural Resources Administration (NRM 406) .....			4
Senior Project (NRM 461, 462) .....	2	2	
Aerial Photogrammetry (AE 345) .....	3		
General Psychology (Psy 202) .....	3		
* Major/Support Courses .....		3	6
* Concentration .....	4	5	6
Electives .....		3	
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for description of courses in Natural Resources Management and other subjects.

\* Courses to be chosen with the approval of the adviser, including 29 units in a field of concentration.

# ORNAMENTAL HORTICULTURE DEPARTMENT

Department Head, Ronald D. Regan

Anthony J. Amato  
Dennis L. Beck  
Charlotte Burns  
Christopher P. Carley  
E. Wesley Conner  
James A. D'Albro  
Thomas E. Eltzroth

Winton Frey  
Timothy A. Gaskin  
Robert L. Gordon  
Patricia L. Hamer  
David W. Hannings  
Ernest R. Houston  
Kenneth E. Kline

Daniel E. Lassanske  
William E. Noble  
Marshall E. Ochylski  
Frederick H. Oelschig  
Robert P. Rice  
Virginia R. Walter  
Michael D. Zohns

The ornamental horticulture curriculum offers the student a comprehensive preparation for attractive positions in the nursery, greenhouse, landscape, and florist industries. This includes both the production and sales-service areas of these major fields. The curriculum stresses production and marketing of nursery plants, cut flowers, pot plants, and tropical foliage plants, landscape design, planting and supervision, and floral design and marketing.

Graduates of the Ornamental Horticulture Department qualify for management positions in nursery, greenhouse, and florist establishments, as well as supervisory positions in parks and grounds. Many of the graduates enter the field of teaching. Some of the most popular areas of employment include plant propagation, nursery sales, cut flower and pot plant production, greenhouse management, landscape design, landscape contracting and maintenance, the field of advising for fertilizer and pesticide companies, and floral design and floral shop management.

The facilities of the department include a student-operated commercial greenhouse range and nursery in which students carry on a project program involving wholesale and retail sales and a student-operated florist shop in which, in addition to plant sales, students design and sell floral pieces. Also included are 28,000 square feet of glasshouses, including a solar-heated house, 7,500 square feet of shadehouses, and an extensive field container growing area. Large, modern, well-equipped laboratories, including a tissue culture laboratory, adjoin the greenhouse range. In addition to 200 acres of landscaped campus, an arboretum is also utilized as an outdoor laboratory. The campus is planted with many interesting and unusual trees and shrubs from all over the world, as well as native plant materials.

Also available are the latest models of equipment necessary in nurseries, greenhouses, parks and grounds, landscaping, and florist shops. An extensive list of periodicals covering the field of ornamental horticulture is available to students. Through the staff, affiliation in several national and state horticultural organizations is maintained.

Students interested in the two-year technical certificate should refer to the introductory statement for the School of Agriculture and Natural Resources which describes this program. Detailed curriculum information is available from the department head.

## CURRICULAR CONCENTRATIONS

### Floriculture and Design

This concentration is designed to educate the student in the production and management of floriculture crops and the use of these crops in floral design.

### Landscape Industry

This concentration is designed to educate the student to be versatile in the fields of landscape design, installation and management.

### Nursery Management

This concentration is designed to prepare the student for production and management work in the nursery industry. Its main courses in the curriculum are propagation and management.

## CURRICULUM IN ORNAMENTAL HORTICULTURE

	F	W	S
<b>Freshman</b>			
Fundamentals of Ornamental Horticulture (OH 131, 132, 133) .....	4	4	4
Principles of Landscape Design I (OH 101) .....	3		
Principles of Landscape Design II (OH 102) .....		3	
Agricultural Mechanics (AE 121) .....	2		
Ornamental Horticulture Construction (OH 126) .....			2
Agricultural Surveying (AE 131) .....		2	
Agricultural Tractors and Equipment Skills (AE 141) .....			3
English Composition (Engl 114) .....	4		
Mathematics (Math 102, 103, or 113, 114) .....		3	3
General Botany (Bot 121, 123) .....		4	4
Physical Education electives .....	2		1
# Electives and courses to complete major .....	2		
	17	16	17
<b>Sophomore</b>			
Plant Materials (OH 231, 232, 233) .....	4	4	4
Soils (SS 121) .....	4		
Entomology (Ent 220 or CrSc 311) .....			4
Fertilizers (SS 221) .....		4	
Principles of Speech (Sp 200) .....		3	
Economics (Econ 201 or 211) .....			3
General Psychology (Psy 202) .....	3		
Report or Technical Writing (Engl 218 or 219) .....	3		
# Electives and courses to complete major .....	3	5	5
	17	16	16
<b>Junior</b>			
Diseases and Pests of Ornamental Plants (OH 327) .....			4
Ornamental and Forest Pathology (Bot 324) .....	4		
Basic Accounting (Actg 131, 132) .....	3	3	
American Government (Pol Sc 201) .....			3
General Chemistry (Chem 121, 122) .....	4	4	
Business Law Survey (Bus 201) .....		3	
Approved science elective .....		3	4
# Electives and courses to complete major .....	6	4	5
	17	17	16
<b>Senior</b>			
Senior Project (OH 461, 462) .....	2	2	
Undergraduate Seminar (OH 463) .....			2
Management elective (AM 300-400) .....		3	
Survey of Organic Chemistry (Chem 226) .....	4		
* Literature, Philosophy .....	3	3	
* Humanities elective .....			3
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Fruit Science elective (200-400 level) .....		4	
Approved science elective .....	4		
# Electives and courses to complete major .....	4	1	8
	17	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Ornamental Horticulture and other subjects.

# Of the total elective units 26-29 must be chosen in a field of concentration with approval of the adviser; with a minimum of 17 units of 300-400 level.

\* To be chosen in accordance with the General Education requirements.

# POULTRY INDUSTRY DEPARTMENT

Department Head, Robert A. Voitle  
Roland Pautz

The function of the Poultry Industry major is to prepare students for a wide variety of positions in the commercial poultry industry and in many allied services related directly to the industry. Opportunities in the industry are many and varied as evidenced by the fact that graduates have worked in more than fifty types of jobs in the industry.

Poultry students have an opportunity to conduct enterprise projects in the production of market eggs, hatching eggs, meat birds, replacement pullets, turkeys, and game birds, which give them valuable experience in production techniques as well as exposure to a number of business activities related to production. Advanced students may have opportunities to study special topics related to problems in management of commercial poultry flocks.

The University has facilities for more than 5,000 adult and over 6,000 growing chickens on approximately 10 acres of land. The poultry unit maintains flocks of a number of breeds and varieties of chickens for both egg and meat production. Flocks of turkeys and several game bird species are maintained in support of the instructional program. A 15,000-egg capacity hatchery is equipped to hatch eggs ranging in size from quail to turkeys. A well-equipped poultry processing plant and egg handling and processing facility enables students to gain experience in these areas.

Students interested in the two-year technical certificate should refer to the introductory statement for the School of Agriculture and Natural Resources, which describes this program. Detailed curriculum information is available from the department head.

## CURRICULUM IN POULTRY INDUSTRY

Freshman	F	W	S
Poultry Industry Development (PI 121) .....	4		
Replacement Programs & Broiler Production (PI 122) .....		4	
Poultry Feeding and Nutrition (PI 123) .....			4
Dairy Feeds and Feeding (DH 101) .....	2		
Agricultural Engineering Elective .....		2	2
Freshman Composition (Engl 104, 105) .....	3	3	
Mathematics electives .....	3	3	
Health Education (PE 250) .....	2		
Physical Education activity .....		1	
General Zoology (Zoo 131) .....		4	
General Botany (Bot 121) .....			4
Soils (SS 121) .....			4
Electives .....	2		3
	16	17	17
Sophomore			
Poultry Selection and Egg Production (PI 221) .....	3		
Poultry Production Processing and Marketing (PI 222) .....		3	
Poultry Incubation (PI 223) .....			2
Poultry Plant Design and Equipment (PI 233) .....			2
Agricultural Engineering or Welding .....	2		
Poultry Anatomy and Physiology (PI 231) .....	2		
Report Writing (Engl 218) .....			3
Principles of Speech (Sp 200) .....		3	
Economics (Econ 201 or 211) .....	3		
** Humanities elective .....		3	
AM 250 or Computer Science elective .....			3

\*\* To be selected in accordance with General Education requirements.

	F	W	S
General Bacteriology (Bact 221) .....	4		
Genetics (Bio 303) .....		3	
General Psychology (Psy 202) .....		3	
# Business Management .....			3
Electives .....	3	2	3
	17	17	16
<b>Junior</b>			
Applied Poultry Breeding (PI 321) .....	3		
Hatchery Business Organization (PI 322) .....		4	
Poultry Diseases and Hygiene (PI 323) .....			3
Dairy and Poultry Products Merchandising (DM 202) .....		3	
Agricultural Engineering .....			3
Farm Records or Accounting (AM 321 or Actg 221) .....	4		
Agricultural Economics or Economics (AM 212 or Econ 212) .....		3	
** Literature/Philosophy .....	3		3
American Government (Pol Sc 201) .....		3	
Growth of American Democracy (Hist 204) .....			3
General Chemistry (Chem 121, 122) .....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
Electives .....	3		
	17	17	16
<b>Senior</b>			
Advanced Poultry Enterprise Supervision (PI 402) .....		3	
Turkey Industry (PI 421) .....	3		
Senior Project (PI 461, 462) .....	2	2	
Undergraduate Seminar (PI 463) .....			2
Animal Nutrition (ASci 402) .....			4
U.S. in World Affairs (Hist 205) .....			3
Biochemistry (Chem 328) .....		4	
Computer Science elective .....			2
# # Management elective .....	3		
Electives .....	8	7	5
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Dairy Husbandry, Dairy Manufacturing, Poultry Industry and other subjects.

# To be selected from Bus 201, Mgt 118, Mgt 311.

\*\* To be selected in accordance with General Education requirements.

# # 200-400 series courses in AM, Bus, or Mgt.

# SOIL SCIENCE DEPARTMENT

Department Head, Curtis Dean Piper

Gaston Amedee  
Terence H. Cooper  
Arnold M. Dean  
Delmar D. Dingus

Brent G. Hallock  
Royce L. Lambert  
David B. Lesczynski  
Thomas A. Ruehr

Edwin C. Seim  
Ronald D. Taskey  
Roger A. Vinande

The curriculum of the Soil Science Department prepares graduates for employment in professional positions encompassing the various fields of agriculture, such as soil conservationists, land appraisers, fertilizer distributors, farm advisers, farm managers, farm operators or agriculture teachers, and highly specialized positions such as those of soil surveyors, laboratory technicians, soil specialists, and graduate studies.

Facilities of the department have been developed to provide laboratory, glasshouse space, land and equipment to emphasize the utilization of classroom knowledge in a practical work situation. The use of demonstration plots, agriculture internships, and the application of accepted cultural practices on the campus farm are among the methods utilized to integrate the classroom with working experiences and careers.

Students who elect to major in soil science develop a broad background in the basic sciences and are presented with ample opportunities to apply the skills learned to the practical solutions of agricultural problems. The students who select courses in soil science as electives will gain an appreciation for the important relationship between man and the soil in regard to meeting society's needs for food and fiber.

## CURRICULUM IN SOIL SCIENCE

Freshman	F	W	S
Orientation in Soil Science (SS 100) .....	1		
Soils (SS 121) .....	4		
Soil Management (SS 122) .....		4	
Soil Materials (SS 123) .....			3
Crop Science elective .....	4		
Animal Production (ASci 230 or DH 230 or PI 230) .....			4
Agricultural Surveying (AE 131) .....			2
General Chemistry (Chem 127, 128) .....		4	4
Freshman Composition (Engl 104, 105 or 218) .....	3	3	
§ Mathematics .....		3	3
General Botany (Bot 121) .....	4		
Health Education (PE 250) .....		2	
	16	16	16
Sophomore			
Soil Conservation (SS 202) .....		3	
Fertilizers (SS 221) .....	4		
Fruit Science elective .....	4		
Ornamental Horticulture elective .....			3
Irrigation (AE 340) .....			4
Natural Resources Management elective .....		3	
General Chemistry (Chem 129) .....	4		
Survey of Organic Chemistry (Chem 226) .....		4	
Biochemistry (Chem 328) .....			4
Economics (Econ 201 or 211) .....	3		
Physical Education activity .....	1		
American Government (Pol Sc 201) .....		3	

§ A minimum of 6 units shall be chosen with the approval of the adviser from 113 and/or higher courses in mathematics.

	F	W	S
Growth of American Democracy (Hist 204) .....			3
Physics (Phys 104 or 121) .....		4	
Electives .....			3
	16	17	17
<b>Junior</b>			
Soil Classification (SS 321) .....	4		
Soil Fertility (SS 322) .....		3	
Land Use Planning (SS 433) .....			3
Farm Records (AM 321) or Basic Accounting (Actg 131) .....	4		
† Management elective .....			3
†† Botany elective .....		4	
General Bacteriology (Bact 221) .....	4		
General Entomology (Ent 326) or Insect Control (CrSc 311) .....	4		
U.S. in World Affairs (Hist 205) .....		3	
Principles of Speech (Sp 200) .....		3	
Literature/Philosophy elective .....		3	
Experimental Techniques and Analysis (CrSc 411) .....			4
Approved Science or Mathematics .....			4
Electives .....	1	2	3
	17	18	17
<b>Senior</b>			
Soil Microbiology (SS 422) .....		3	
Soil Chemistry (SS 423) .....			4
Soil Physics (SS 432) .....	4		
Senior Project (SS 461, 462) .....	2	2	
Undergraduate Seminar (SS 463) .....			2
** Approved Social Sciences course .....		3	
Literature/Philosophy elective .....			3
†† Botany elective .....		4	
** Humanities elective .....	3		
† Management elective .....	3		
Electives .....	4	5	6
	16	17	15

See COURSES OF INSTRUCTION section of this catalog for description of courses in Soil Science and other subjects.

† To be selected from any 300-400 series course in AM, or Bus Adm.

†† To be selected from Bot 322, 323, 325, or 123.

\*\* To be selected in accordance with the General Education requirements.

## VETERINARY SCIENCE DEPARTMENT

Department Head, Wallace F. Glidden

Edward T. Henry

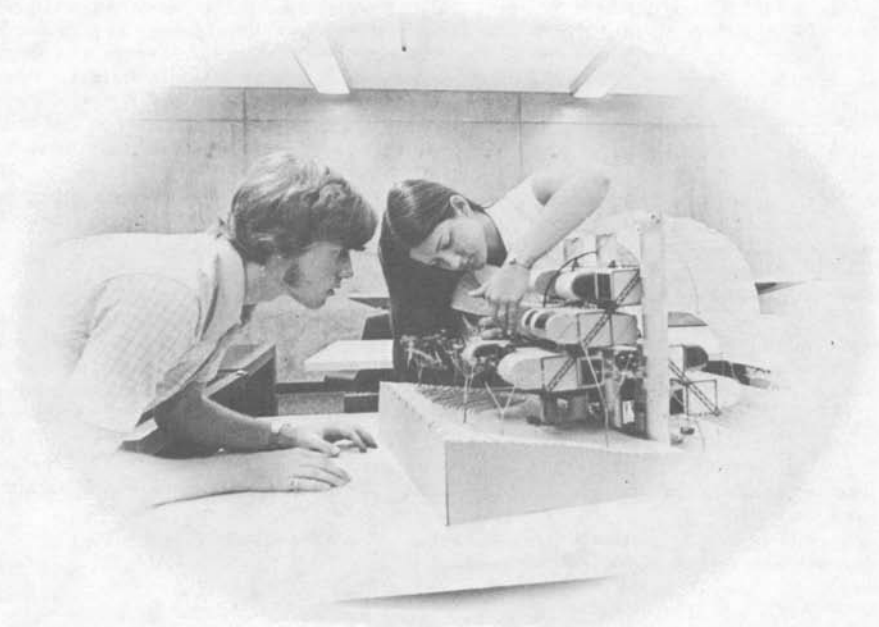
Dale A. Smith

The Veterinary Science Department offers basic veterinary science courses for students enrolled in the animal science and dairy science majors. Veterinary science courses are open for elective credit to students who have completed the required prerequisites. Consultative services are offered to students pursuing pre-veterinary training as a complement to their major field of study. The department also provides veterinary service for the University's animal resources, meat inspection, and preventive medicine related to the potentials for zoonotic disease.





School of Architecture  
and Environmental Design



# SCHOOL OF ARCHITECTURE AND ENVIRONMENTAL DESIGN

George J. Hasslein, FAIA, Dean  
Kenneth E. Schwartz, FAIA, Associate Dean

The School of Architecture and Environmental Design offers five bachelor of science degree programs: Architecture, Architectural Engineering, City and Regional Planning, Construction, and Landscape Architecture. The student is kept aware that these programs have a common objective and that they are all aimed at the betterment of human physical environment. These programs endeavor to give the student a set of social values, a technical background, and a training which result in creative expressions that are effective both professionally and personally.

Two graduate programs are offered: the Master of Architecture is designed for the person who seeks registration as a licensed professional architect; the Master of City and Regional Planning is designed for the person who aspires for a planning position at the professional level.

The excellent School facilities include design laboratories, dark rooms, soils laboratory, stress laboratory, shops, construction yard, project yard and grading galleries. An outlying area of 12 acres known as the "Canyon" is available for extensive experimental construction. The location of the campus between the great population centers of San Francisco and Los Angeles is ideal for an environmental design school in that it permits concentration and provides for environmental studies ranging from rural to large metropolitan complexes. There is a continual stream of visiting instructors. Field trips are arranged to various parts of the State as required work.

The School is a Member of the Association of Collegiate Schools of Architecture and maintains a Student Chapter of the American Institute of Architects and Scarab, the professional architectural fraternity. Likewise, student chapters of the American Planning Association, the Engineering Grading Contractors Association, the Construction Specification Institute, and the American Society of Landscape Architects are active and maintain liaison between the respective professional organizations and the School.

## Common Coursework

The first two years of all five programs contain much common material and develop basic skills and background. Students who are unsure of their degree objective should consult with their advisors in order to maintain programs of study which will keep their options flexible.

The prospective transfer student can best prepare for architecture, architectural engineering or construction by taking equivalent Mathematics, Physics and other General Education courses. Wherever possible, the student should prepare including as much as possible of the following: 24 semester units of introductory architectural courses: Perspective 2, Freehand Drawing 1, Basic Graphics 2, Architectural Design 10, Materials of Construction 2, Architectural Drafting 4.

All student work submitted for course credit becomes School property and will be returned only at the discretion of the instructor.

# ARCHITECTURAL ENGINEERING DEPARTMENT

Department Head (Acting), Dell Orey Nickell

Thomas J. Ballew  
John W. Edmisten  
Jacob Feldman

Raymond J. Hauser  
Carl C. Hsieh  
Hans L. Mager

William R. Phillips  
Satwant S. Rihal  
David R. Saveker

The four-year program in Architectural Engineering leads to the Bachelor of Science degree and has its major emphasis in the structural engineering of buildings. Students are encouraged to develop aptitudes in science and mathematics for creative engineering accomplishments. Graduates of this program in general will seek professional registration as civil and structural engineers. Additional architectural studies also will permit graduates to achieve registration as architects. The Architectural Engineering curriculum is accredited by the Engineers' Council for Professional Development (ECPD).

The curriculum prepares the student to enter the field of architectural engineering, structural engineering, and the technically-oriented aspects of architecturally-related fields. In addition, students are prepared to pursue graduate studies in the general field of civil engineering.

Freshman	F	W	S
Intro to Architecture and Environmental Design (EDes 101) .....	2		
Descriptive Drawing (EDes 110) .....	1		
Introduction to Drawing and Perspective (EDes 111) .....		3	
Basic Graphics (EDes 112) .....			3
Materials of Construction (Arch 106) .....			3
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Physics (Phys 131, 132) .....		4	4
Engineering Surveying (AE 237) .....	2		
Freshman Composition (Engl 104) .....	3		
Written or Oral Communication .....		3	
General Psychology (Psy 202) .....	3		
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Physical Education activity .....		1	1
	18	18	18
Sophomore			
Environmental Design Fundamentals (EDes 201, 202, 203) .....	3	3	3
** Approved technical elective .....	3		
Digital Computer Applications (EDes 250) .....		2	
Architectural Practice (Arch 231, 232) .....		3	3
Structures (ArcE 221, 222, 223) .....	3	3	3
Introduction to Urban Environment (CRP 212) .....			3
General Physics (Phys 133 or 137) .....	4		
Survey of Economics (Econ 201) .....	3		
* Philosophy elective .....		3	
* Literature elective .....			3
* Life Science elective .....			3
Physical Education activity .....	1		
Elective .....		3	
	17	17	18

\*\* To be selected with adviser approval.

\* To be selected in accordance with the General Education requirements.

Junior	F	W	S
Stress Analysis Lab (ArcE 301) .....	1		
Timber Design (ArcE 302) .....	3		
Steel Design (ArcE 303) .....		3	
Structural Analysis (ArcE 304) .....			3
Design Analysis for Engineers (ArcE 361, 362, 363) .....	4	4	4
Soil Mechanics (ArcE 421) .....			3
Introduction to Environmental Design Science (EDes 221) .....	3		
Building Support Systems (Arch 308, 309) .....		3	3
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Numerical Linear Analysis (CSc 331) .....			3
Physical Geology (Geol 201) .....	3		
General Chemistry (Chem 124) .....		4	
Elective .....			2
	18	18	18
Senior			
Matrix Analysis of Structures (ArcE 411) .....	3		
Seismic Design (ArcE 483) .....		3	
Concrete Testing Laboratory (ArcE 415) .....	1		
Foundation Design (ArcE 422) .....	3		
Design Analysis for Engineers (ArcE 431, 432, 433) .....	2	3	2
Structural Design (ArcE 444, 445, 446) .....	5	5	5
Senior Project (ArcE 461, 462) .....	2	2	
Advanced Materials Testing Laboratory (ArcE 481, 482) .....		1	1
Undergraduate Seminar (EDes 463) .....			2
* Humanities elective .....		3	
Approved technical elective .....			3
Electives .....			4
	16	17	17

\* To be selected in accordance with the General Education requirements.

# ARCHITECTURE DEPARTMENT

Department Head (Acting), Carleton M. Winslow, Jr.

Joseph C. Amanzio	Rufus L. Graves, Jr.	Jens G. Pohl
Robert F. Asbury, Jr.	Kenneth L. Haggard	Benjamin K. Polk
Sharad D. Atre	John E. Harrigan, Jr.	Charles W. Quinlan
James R. Bagnall	Patrick D. Hill	Marcel Sedletzky
Ronald E. Batterson	George K. Ikenoyama	Arthur H. Silvers
George M. Baumgarten	Howard F. Itzkowitz	John S. Stuart
David A. Brodie	Donald J. Koberg	Vern Swansen
William H. Brown	John H. Lange	Don E. Swearingen
Arthur J. Chapman	Willard L. McGonagill	Gerald J. Veverka
Allan R. Cooper	Sixto E. Moreira	Wesley S. Ward
John P. Cutler	Paul R. Neel	Maurice L. Wilks
Jay D. Farbstein	Raymond E. Nordquist	Philip F. Winninghoff
Merrill C. Gaines	Ameen I. Noshay	Paul M. Wolff
Donald P. Grant		

The objective of the five year Bachelor of Architecture degree is to develop design and related skills necessary for entry into the professional field of architecture. Preparation for architecture spans several disciplines and requires a range of aptitudes. As the architect has a responsibility for solving problems of the built environment involving people, he/she is required to develop an understanding and sensitivity to human needs. Therefore, programs in architecture are broad in nature. With careful selection of elective work, areas of specialization can be included. The Master of Architecture degree is accredited by the National Architectural Accrediting Board.

## CURRICULUM IN ARCHITECTURE

Freshman	F	W	S
Intro to Architecture and Environmental Design (EDes 101) .....	2		
Descriptive Drawing (Edes 110) .....	1		
Introduction to Drawing and Perspective (EDes 111) .....		3	
Basic Graphics (EDes 112) .....			3
Materials of Construction (Arch 106) .....			3
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Physics (Phys 131, 132) .....		4	4
Engineering Surveying (AE 237) .....	2		
Freshman Composition (Engl 104) .....	3		
Written or Oral Communication .....		3	
* Life Science elective .....	3		
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Physical Education activity .....		1	1
	18	18	18
Sophomore			
Environmental Design Fundamentals (EDes 201, 202, 203) .....	3	3	3
** Approved technical elective .....	3		3

\* To be selected in accordance with the General Education requirements.

\*\* To be selected with advisor approval.

	F	W	S
Introduction to Environmental Design Science (EDes 221) .....		3	
Principles of Site Analysis (EDes 213)			
or Introduction to Urban Environment (CRP 211)			
or Urban Design in Architecture (Arch 245) .....		3	
Digital Computer Applications (EDes 250) .....			2
Architectural Practice (Arch 231, 232) .....		3	3
Structures (ArcE 221, 222, 223) .....	3	3	3
Introduction to Urban Environment (CRP 212) .....			3
General Physics (Phys 133 or 137) .....	4		
Survey of Economics (Econ 201) .....	3		
Advanced Delineation (Arch 213) .....		2	
Physical Education activity .....	1		
	17	17	17
<b>Junior</b>			
History of Architecture (Arch 317, 318, 319) .....	3	3	3
Architectural Practice (Arch 341, 342, 343) .....	2	2	2
Architectural Design (Arch 351, 352, 353) .....	4	5	5
Structures (ArcE 321, 322, 323) .....	3	3	3
Stress Analysis Laboratory (ArcE 301) .....	1		
Building Support Systems (Arch 308, 309) .....		3	3
Building Systems elective (Arch 470) .....	3		
	16	16	16
<b>Senior</b>			
Undergraduate Seminar (Arch 463) .....			2
Architectural Practice (Arch 441, 442, 443) .....	2	2	2
Architectural Design (Arch 451) .....	5	5	5
Approved technical electives .....	3	3	4
* Social Science elective .....		3	
* Philosophy elective .....	3		
Electives .....	3	3	3
	16	16	16
<b>5th Year</b>			
Architectural Design (Arch 481) .....	5	5	5
Design Project (Arch 491, 492, 493) .....	2	2	2
* Humanities elective .....		3	
* Literature elective .....	3		
** Approved technical electives .....	3	3	6
Electives .....	3	3	3
	16	16	16

## CURRICULUM FOR THE MASTER OF ARCHITECTURE DEGREE

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>
Architectural Design .....	24
Courses at 400 and 500 level in the School of Architecture and Environmental Design .....	21
Thesis Project .....	9
Approved electives at 300, 400, 500 level .....	18
	72

\* To be selected in accordance with the General Education requirements.

\*\* To be selected with departmental approval.

# CITY AND REGIONAL PLANNING DEPARTMENT

Department Head (Acting), Joseph M. Kourakis

Francis H. Hendricks

Steven C. Orlick

Edward J. Ward

Michael E. McDougall

The four-year curriculum leading to a Bachelor of Science degree in City and Regional Planning is directed to the professional field which guides and designs the communities wherein we live. Inasmuch as the education of the student of planning is associated with that of the architect and the engineer, the program has an additional emphasis on design of the physical environment as well as on the process of planning. Concern with the activities of people and their values is essential.

## CURRICULUM IN CITY AND REGIONAL PLANNING

Freshman	F	W	S
Introduction to Architecture and Environmental Design (EDes 101) ..	2		
Descriptive Drawing (EDes 110) .....	1		
Introduction to Drawing & Perspective (EDes 111) .....		3	
Basic Graphics (EDes 112) .....			3
General Botany (Bot 121) .....		4	
* Natural Science elective .....	3		
Physical Geology (Geol 201) .....			3
Math for Life Sciences (Math 111) .....	3		
Elementary Probability and Statistics (Stat 211) .....		3	
Statistical Methods (Stat 212) .....			3
Freshman Composition (Engl 104, 105) .....	3	3	
Principles of Speech (Sp 200) .....			3
American Government (PolSc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
General Psychology (Psy 202) .....	3		
Survey of Economics (Econ 201) .....			3
Physical Education activity .....		1	
	18	17	18
Sophomore			
Environmental Design Fundamentals (EDes 201, 202, 203) .....	3	3	3
** Approved technical elective .....	3		
Introduction to Urban Environment (CRP 211, 212) .....	3	3	
Introduction to Planning Information (CRP 213) .....			3
* Natural Science elective .....	3		
Introduction to Conservation (Cons 311) .....		3	
* Humanities elective .....	3		
* Literature elective .....			3
Principles of Sociology (Soc 201) .....		3	
Digital Computer Applications (EDes 250) .....		2	
† Economics elective .....			3
Aerial Photogrammetry (AE 345) .....			3
Logic (Phil 221 or 222) .....		3	
Physical Education activity .....	1		1
	16	17	16

\* To be selected in accordance with the General Education requirements.

\*\* To be selected with adviser approval.

† Econ 212 or above.

Junior	F	W	S
Planning Theory (CRP 301, 302) .....	3	3	
Quantitative Methods for Planning (CRP 316) .....	3		
Planning Lab (CRP 351, 352, 353) .....	4	4	4
Design for Planners (CRP 347, 348, 349) .....	3	3	3
Urban Sociology (Soc 313) .....	3		
Environmental and Planning Regulations (CRP 420) .....			3
Social Psychology (Psy 401) .....		3	
Municipal Government (PolSc 403) .....		3	
** Approved electives.....			6
Electives .....	3		
	19	16	16
Senior			
Senior Project (CRP 461, 462) .....	2	2	
Undergraduate Seminar (EDes 463) .....			2
Planning Theory (CRP 401, 402) .....	3	3	
Planning Laboratory (CRP 451, 452, 453) .....	4	4	4
** Approved electives.....	6	6	3
Electives .....			6
	15	15	15

## CURRICULUM FOR THE MASTER OF CITY AND REGIONAL PLANNING

(For University requirements see the *Graduate Studies Announcement*)

Courses, or equivalents, to be completed prior to acceptance for graduate study:

Stat 212 Statistical Methods .....	3
EDes 250 Digital Computer Applications .....	2
Econ 201 Survey of Economics .....	3
Bio 301 Human Ecology or Cons 311 Introductory Conservation .....	3
Sp 200 Principles of Speech .....	3
Soc 313 Urban Sociology .....	3
PolSc 321 American Constitutional Law .....	3

Core courses:

CRP 501, 502 Foundations in Planning .....	4, 3
CRP 505 Perspectives in Regional Planning .....	3
CRP 506 Philosophy of Urban Design .....	3
CRP 510 Contemporary Planning Theory .....	3
CRP 511 Advanced Planning Theory .....	3
CRP 515 Graphic Communications .....	3
CRP 516 Quantitative Methods .....	3
CRP 520 Advanced Regulations and Controls .....	3
CRP 530 Planning Administration .....	3
CRP 552, 553 Foundations in Planning Applications .....	5, 5
CRP 554, 555 Advanced Planning Laboratory .....	5, 5
CRP 599 Thesis .....	6

Unit range (depending on individual student preparation)..... 40-57

Support Courses:

CRP 570 and others Planning electives.....	12
Approved electives .....	3-20

15-32

Minimum total units ..... 72

\*\* To be selected with adviser approval.



# CONSTRUCTION DEPARTMENT

Department Head (Acting), James Rodger

Albert W. Draves

Matthias R. Wall

Helmut L. Schleicher

The four-year program in Construction leads to the Bachelor of Science degree which is accredited by the American Council for Construction Education. Major emphasis is placed on organizing and managing the construction phase of society's efforts to improve the environment. The constructor is an important member of the building team and requires a professional knowledge of techniques, materials, equipment, job planning and cost control to add to the contributions of the planning and design professions. Graduates of this program can help supply the urgent needs of the construction industry and its related fields.

## CURRICULUM IN CONSTRUCTION

Freshman	F	W	S
Intro to Architecture and Environmental Design (EDes 101) .....	2		
Descriptive Drawing (EDes 110) .....	1		
Introduction to Drawing and Perspective (EDes 111) .....		3	
Basic Graphics (EDes 112) .....			3
Materials of Construction (Arch 106) .....			3
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Physics (Phys 131, 132) .....		4	4
Engineering Surveying (AE 237) .....	2		
Freshman Composition (Engl 104) .....	3		
Principles of Speech (Sp 200) .....		3	
General Psychology (Psy 202) .....	3		
American Government (PolSc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Physical Education activity .....		1	1
	18	18	18
Sophomore			
Environmental Design Fundamentals (EDes 201, 202, 203) .....	3	3	3
** Approved technical elective.....	3		
Introduction to Environmental Design Science (EDes 221) .....	3		
Digital Computer Applications (EDes 250) .....			2
Architectural Practice (Arch 231, 232).....		3	3
Structures (ArcE 221, 222, 223) .....	3	3	3
Introduction to Urban Environment (CRP 212) .....		3	
General Physics (Phys 133 or 137) .....	4		
Survey of Economics (Econ 201).....		3	
* Philosophy elective .....		3	
* Life Science elective .....			3
* Literature elective .....			3
Physical Education activity .....	1		
	17	18	17

\*\* To be selected with adviser approval.

\* To be selected in accordance with the General Education requirements.

Junior	F	W	S
Construction Practice (Cstr 341, 342, 343) .....	4	4	4
Stress Analysis Laboratory (ArcE 301) .....	1		
Structures (ArcE 321, 322, 323) .....	3	3	3
Building Support Systems (Arch 308, 309) .....	3	3	
General Chemistry (Chem 124) .....	4		
Basic Accounting (Actg 131) .....		3	
Business Law Survey (Bus 201) .....		3	
Elementary Probability and Statistics (Stat 211) .....			3
Behavior in Organizations (Psy 302) .....			3
* Humanities elective .....			3
	15	16	16
Senior			
Construction Practice (Cstr 441, 442, 443) .....	2	2	2
Construction Laboratory (Cstr 451, 452, 453) .....	5	5	5
Senior Project (Cstr 461, 462) .....	2	2	
Undergraduate Seminar (EDes 463) .....			2
Survey of Foundation Engineering (ArcE 409) .....		3	
Physical Geology (Geol 201) .....	3		
Approved technical elective .....			3
Electives .....	3	3	3
	15	15	15

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\* To be selected in accordance with the General Education requirements.

# LANDSCAPE ARCHITECTURE DEPARTMENT

Department Head (Acting), John F. Gillham

Gary C. Dwyer

Roger J. Osbaldeston

Walter M. Tryon

Alice C. Loh

Dale A. Sutliff

K. Richard Zweifel

The four-year program for a Bachelor of Science degree in Landscape Architecture is recognized by the California State Board of Landscape Architects and is accredited by the American Society of Landscape Architects. Emphasis is placed on the design and functional organization of open space and the conservation and revitalization of both the natural and urban landscapes. These range in scope from small project units to systems of urban, rural, and regional scale. Complementary course work develops the additional tools and skills that are necessary for a project to be realized in built form. Graduates of the program will be prepared for entry level positions in the private and public practice of landscape architecture.

## CURRICULUM IN LANDSCAPE ARCHITECTURE

Freshman	F	W	S
Intro to Architecture and Environmental Design (EDes 101) .....	2		
Descriptive Drawing (EDes 110) .....		1	
Introduction to Drawing and Perspective (EDes 111) .....		3	
Basic Graphics (EDes 112) .....			3
Materials of Construction (Arch 106) .....			3
College Algebra (Math 114) .....	3		
Trigonometry for Agriculture (Math 115) .....		3	
Structure and Behavior of Matter (PSc 101) .....		4	
General Botany (Bot 121) .....	4		
Physical Geology (Geol 201) .....			3
Freshman Composition (Engl 104) .....	3		
Written or Oral Communication .....		3	
General Psychology (Psy 202) .....	3		
Engineering Surveying (AE 237) .....			2
American Government (PolSc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Soils (SS 121) .....			4
Physical Education activity .....		1	
	18	18	18
Sophomore			
Environmental Design Fundamentals (EDes 201, 202, 203) .....	3	3	3
** Approved technical elective .....	3		
Principles of Site Analysis (EDes 213) .....		3	
Digital Computer Applications (EDes 250) .....			2
Introduction to Landscape Architecture (LA 201) .....	2		
Landscape Architecture Practice (LA 231) .....			3
Introduction to Urban Environment (CRP 212) .....			3
Structures for Landscape Architects (Arce 311) .....		3	
Landscape Plants (OH 237, 238, 239) .....	3	3	3
Native Plant Materials (Bot 238) .....	3		
Human Ecology (Bio 301) .....	3		
Introduction to Sociology (Soc 105) .....		3	
Introduction to Conservation (Cons 311) .....		3	
Survey of Economics (Econ 201) .....			3
Physical Education activity .....	1		1
	18	18	18

\*\* To be selected with adviser approval.

Junior	F	W	S
Landscape Architecture Theory (LA 301) .....			3
History of Landscape Architecture (LA 317) .....		3	
Landscape Practice (LA 341, 342, 343) .....	2	2	2
Landscape Plant Composition (LA 347) .....	3		
Design for Landscape Architects (LA 351, 352, 353) .....	5	5	5
Approved technical elective.....			2
Implementation of Landscape Design (OH 451, 452).....	2	2	
Irrigation, Drainage and Grading Practices (AE 337) .....			3
Business Law Survey (Bus 201).....	3		
Urban Sociology (Soc 313) .....		3	
	15	15	15
Senior			
Professional Practice (LA 441).....		3	
Design for Landscape Architects (LA 451, 452, 453) .....	5	5	5
Senior Project (LA 461, 462) .....	2	2	
Undergraduate Seminar (EDes 463) .....			2
Approved technical elective.....	3		
* Literature elective .....	3		
* Philosophy elective .....		3	
* Humanities elective .....			3
Electives .....	2	2	5
	15	15	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Architecture, Architectural Engineering, City and Regional Planning, Construction, Environmental Design, Landscape Architecture, and other subjects.

\* To be selected in accordance with the General Education requirements.



## School of Business



# SCHOOL OF BUSINESS

Robert K. Coe, Dean  
Fuad H. Tellew, Associate Dean

The primary objective of the School of Business is education for business administration. The School of Business seeks to equip its majors with basic knowledge, analytical skills, and attitudes essential to employment in business, government, and other responsible positions in our society, and to serve students throughout the University by providing them with an understanding of the business and economic world in which they live.

To achieve these goals, the School is organized into four departments—Accounting, Business Administration, Economics, and Management. This organization recognizes that education for business requires the interaction of business specialists with faculty in supporting disciplines to provide ability to function in the socio-economic environment in which business exists.

The School offers programs leading to degrees of Bachelor of Science in Business Administration, Master of Business Administration, and Bachelor of Science in Economics. A pre-law advisement service is available to all University students.

The School's educational philosophy follows the Cal Poly tradition—that of enlisting maximum student involvement in the learning process through career-oriented study, special projects, and internships. Educational programs are designed to help the student achieve maximum personal development, to prepare the student for entry into the business world, and to foster citizenship, leadership, and constructive community living. The curriculum includes general education requirements and specialized studies in the student's major field. Optional areas of concentration within each major enable the student to select the program most closely suited to the chosen career field.

## CURRICULUM FOR THE MASTER OF BUSINESS ADMINISTRATION DEGREE

(For University requirements see the *Graduate Studies Announcement*)

The objective of the MBA graduate program is to provide for graduates from diverse academic backgrounds a comprehensive and flexible professional foundation for careers of increasing responsibility in the business community and related fields. It features close faculty-student relationships, limited class size, and an integrated study approach to problem solving and decision making. The program is approximately three quarters in length, beginning in September (Fall Quarter) of each year.

### Preparatory Courses:

The following undergraduate preparatory courses or equivalent must be completed prior to acceptance for graduate study:

Actg 221, 222	Principles of Accounting .....	4	4
Bus 207	Business Law .....	4	
CSc 120	Principles of Business Data Processing.....	4	
Econ 221	Microeconomics .....	4	
Econ 222	Macroeconomics .....	4	
Math 121	Finite Mathematics .....	3	
**Math 222	Mathematical Analysis for Economics and Business.....	4	
Stat 251	Statistical Inference for Management I.....	3	
Stat 252	Statistical Inference for Management II .....	3	

Graduate Courses: *		F	W	S
GSB 521	Marketing Management .....	4		
GSB 531	Business Finance .....	4		
GSB 551	Quantitative Methods in Decision Making .....	4		
GSB 581	Management and Organizational Theory.....	4		
GSB 511	Accounting for Management Planning and Control .....		4	

\* The MBA Program also requires completion of a comprehensive examination.

\*\* Math 221 (Calculus for Business and Economics, 4 units) is a prerequisite for Math 222.

	F	W	S
GSB 541 Microeconomics .....		4	
GSB 552 Operations Management and Information .....		4	
GSB 582 Organizational Analysis, Planning and Decision Making ....		4	
GSB 561 Organizational Behavior .....			4
GSB 571 Business and Society .....			4
GSB 583 Business Policy Strategy .....			4
† Specialized Elective Graduate Course .....			4
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Graduate Studies in Business (GSB).

† Electives: To be selected with approval of the Director of the MBA Program from the following courses:  
Actg 500, Bus 500, Econ 500, Mgt 500, GSB 512, 522, 532, 533, 542, 562, 563, 572, 584.

## ACCOUNTING DEPARTMENT

Department Head, Charles T. Andrews

Lawrence E. Baur, Jr.  
Wallace H. Burt

Robert W. Hill  
M. Zafar Iqbal

David E. Nutter  
Gordon J. Paul  
Richard J. Schmidt

The primary objective of the Accounting Department is to prepare students for high-level careers in public, industrial, and governmental accounting. This is accomplished through a) a broad base of general education to provide an awareness of a person's physical and social environment; b) a common core of business study to provide a general understanding of disciplines such as management, marketing, finance, and economics; c) training in entry-level technical skills, and d) exploration in depth of issues facing accountants in matters of theory, practice, and ethics. The Department also provides courses on a service basis for many other departments of the University. The degree awarded is the Bachelor of Science in Business Administration with a concentration in Accounting.



### CURRICULUM IN ACCOUNTING

Freshman	F	W	S
The Business Enterprise (Bus 101) .....	4		
English Composition (Eng 114, 115) .....	4	4	
Principles of Speech (Sp 200) .....			3
* Humanities elective .....			3
* Literature .....		4	
Physical Education activity .....		1	
Health Education (PE 250) .....	2		
* Natural Sciences .....	4	4	4
Finite Mathematics (Math 121) .....	3		
Calculus for Business and Economics (Math 221) .....		4	
American Government (PolSc 201) .....			3
Principles of Business Data Processing (CSc 120) .....			3
	17	17	16

\* To be selected in accordance with the General Education Requirements.



Sophomore	F	W	S
Micro/Macro Economics (Econ 221, 222) .....	4	4	
Principles of Accounting (Actg 221, 222) .....	4	4	
American Democracy and World Affairs (Hist 206) .....			5
** Social Sciences .....		3	3
Traditional Logic/Modern Logic (Phil 221, 222, or 331).....			3
* Natural Sciences.....	3		
Statistical Inference for Management I (Stat 251) .....	3		
Statistical Inference for Management II (Stat 252) .....		3	
Business Law (Bus 207) .....			4
Written Communication (Eng 300, 304, or 310) .....			3
Electives and courses to complete the major .....	3	3	
	17	17	18
Junior			
Human Resources Management (Mgt 314).....	4		
Organization Behavior (Mgt 317) .....		4	
Managerial Accounting (Actg 301) .....	4		
Financial Management (FPM 342) .....		4	
Marketing Analysis (Mktg 301) .....			4
Organization and Management Theory (Mgt 312) .....	4		
Quantitative Business Analysis and Applications of Data Processing (Mgt 321).....		4	
Production and Operations Management (Mgt 325) .....			4
Intermediate Accounting (Actg 321, 322) .....	4	4	
Tax Accounting (Actg 304) .....			4
Advanced Accounting (Actg 323) .....			4
	16	16	16
Senior			
Money, Banking, and Credit (Econ 337) .....	4		
Business Strategy and Policy Seminar (Mgt 414) .....			4
Business Research (Bus 419).....	3		
Senior Project (Actg 460) .....		2	
Governmental and Social Influences on Business (Bus 404) .....	4		
***Electives and courses to complete the major .....	5	14	12
	16	16	16

All of the above courses except the electives and Actg 321, 322, 323, and 304 are common to the Business Administration Department, Management Department, and Accounting Department curricula required for the B.S. in Business Administration.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Accounting, Business, Economics, Finance and Property Management, Management, Marketing and other subjects.

\*\* Select two from the following courses: Geog 315, Ant 201, Soc 105 or Psy 202.

\* To be selected in accordance with the General Education requirements.

\*\*\* Total of 12 units of Accounting electives must be chosen with the approval of the Accounting adviser.

# BUSINESS ADMINISTRATION DEPARTMENT

Department Head, Walter W. Perlick

Dan Bertozzi, Jr.  
James M. Buxbaum  
Paul L. Dempsey  
Paul Kenyon

Donald R. Kummer  
John R. Lindvall  
Michael S. Noble  
Eugene L. O'Connor

Rol W. Rider, Jr.  
Arthur L. Schwartz  
Stanley B. Smith  
Victor F. Wolcott

The Department offers an undergraduate program leading to the Bachelor of Science degree in Business Administration with concentrations available in Finance and Property Management and in Marketing Management.

The objectives of the Business Administration Department are to provide a level of education that will qualify graduates for entry-level positions in the fields of marketing, finance or real estate. Within the concentrations there is sufficient flexibility to allow each student the opportunity to develop proficiency in subject matter basic to an occupational goal.

The Department provides service courses to many departments of the University, notably in business law and marketing, in addition to the required core courses in the School of Business.

## CURRICULAR CONCENTRATIONS

### Finance and Property Management

This concentration is designed as a flexible program for the student wishing to pursue opportunities in the fields of finance and real estate.

### Marketing Management

Marketing includes all macro and micro activities involved in directing the flow of goods and services from producers through intermediate processors to ultimate consumers. This concentration emphasizes management of organization marketing activities in coordination with all other activities to accomplish organization objectives.

## CURRICULUM IN BUSINESS ADMINISTRATION

Freshman	F	W	S
The Business Enterprise (Bus 101) .....	4		
English Composition (Engl 114, 115) .....	4	4	
Principles of Speech (Sp 200) .....			3
* Humanities elective .....			3
Physical Education activity .....		1	
Health Education (PE 250) .....	2		
* Natural Sciences .....	4	4	4
Finite Mathematics (Math 121) .....		3	
Calculus for Business and Economics (Math 221) .....			4
Principles of Business Data Processing (CSc 120) .....			3
Electives and courses to complete major .....	3	4	
	17	16	17
Sophomore			
Micro/Macro Economics (Econ 221, 222) .....	4	4	
Principles of Accounting (Actg 221, 222) .....	4	4	
American Democracy and World Affairs (Hist 206) .....			5
** Social Sciences .....		3	3
Traditional Logic/Modern Logic (Phil 221, 222 or 331) .....			3
* Natural Sciences .....	3		
Statistical Inference for Management I (Stat 251) .....	3		
Statistical Inference for Management II (Stat 252) .....		3	

\* To be selected in accordance with the General Education requirements.

\*\* Select two from the following courses: Geog 315, Ant 201, Soc 105 or Psy 202.

	F	W	S
Business Law (Bus 207) .....			4
Written Communication (Eng 300, 304, or 310) .....			3
American Government (PolSc 201) .....		3	
Electives and courses to complete the major .....	3		
	<u>17</u>	<u>17</u>	<u>18</u>
<b>Junior</b>			
Human Resources Management (Mgt 314) .....	4		
Organizational Behavior (Mgt 317) .....			4
Managerial Accounting (Actg 301) .....	4		
Financial Management (FPM 342) .....		4	
Marketing Analysis (Mktg 301) .....	4		
Organization and Management Theory (Mgt 312) .....	4		
Quantitative Business Analysis and Applications of Data Processing (Mgt 321) .....		4	
Production and Operations Management (Mgt 325) .....			4
Money, Banking, and Credit (Econ 337) .....		4	
***Electives and courses to complete the major .....		4	8
	<u>16</u>	<u>16</u>	<u>16</u>
<b>Senior</b>			
* Literature .....	4		
Business Strategy and Policy Seminar (Mgt 414) .....			4
Business Research (Bus 419) .....		3	
Senior Project (Bus 460) .....			2
Government and Social Influences on Business (Bus 404) .....	4		
***Electives and courses to complete the major .....	8	13	10
	<u>16</u>	<u>16</u>	<u>16</u>

All of the above courses except the electives are common to the Business Administration Department, Management Department, and Accounting Department curricula required for the B.S. in Business Administration.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Accounting, Business, Economics, Finance and Property Management, Management, Marketing and other subjects.

\*\*\* 27 units of concentration electives must be chosen with approval of the adviser.

\* To be selected in accordance with the General Education requirements.



# ECONOMICS DEPARTMENT

Department Head (Acting), George M. Eastham

John P. Adams, Jr.  
George M. Beardsley  
James B. Griffin  
Timothy W. Kersten

Panagiotis Papakyriazis  
Dominic Perello  
Walter E. Rice  
Alden F. Shiers

Howard F. Smith  
Fuad H. Tellev  
Daniel P. Williamson

The Economics Department has two broad purposes: it serves all schools of the campus by offering courses which will help students to understand the overall functioning of the American economy; secondly, it offers an undergraduate program leading to the Bachelor of Science Degree in Economics.

The Economics degree program will prepare students for employment in business and government as economists, analysts and general managers. The teaching of economics in high school is another occupational field for the economist. Finally, the program will prepare students to undertake graduate study in economics, law, business administration and related fields in the Social Sciences.

## CURRICULAR CONCENTRATIONS

Economics majors may take any concentration offered by the School of Business or the Division of Social Sciences in lieu of the economics concentrations described below, provided appropriate prerequisites are satisfied.

### Business and Industrial Economics

The Business and Industrial Economics concentration, designed for those students who intend to seek business and industrial application of the economics discipline, provides a balanced program of economic and business theory and application.

### International Trade and Development

This concentration provides a core of trade and development theory, plus study in ancillary elective fields that meet the occupational needs of students. It is designed for those students interested in working in an international area in the public or private sectors.

### Quantitative Economics

This concentration will offer a combination of mathematics, statistics, and quantitative economics courses. As a unit they are designed to provide the graduate with a background adequate for employment in a variety of business and other situations where the economic decision makers rely on the precision of the mathematician's tools, or for entrance to graduate study in such fields as economics, business administration, or operations research.

## CURRICULUM IN ECONOMICS

Freshman	F	W	S
Introduction to Economics (Econ 101) .....	2		
English Composition (Engl 114, 115) .....	4	4	
Principles of Business Data Processing (CSc 120) .....		3	
** Calculus for Business and Economics (Math 221) .....	4		
** Mathematical Analysis for Economics and Business (Math 222) .....		4	
Health Education (PE 250) .....			2
Physical Education activity .....			1
* Natural Sciences .....	3	3	6
Introduction to Sociology (Soc 105) .....	3		
* Humanities elective .....		3	
Literature .....			3
Electives .....	2	1	5
	18	18	17

\*\* Students in the Quantitative Concentration take Math 141, 142, 143, and Stat 321, 322 in lieu of the above mentioned courses.

\* To be selected in accordance with the General Education requirements.

Sophomore	F	W	S
Micro/Macro (Econ 221, 222) .....	4	4	
Principles of Accounting (Actg 221, 222) .....	4	4	
* Natural Science .....	3		
** Statistical Inference for Management I (Stat 251) .....		3	
** Statistical Inference for Management II (Stat 252) .....			3
Report Writing or Technical Writing (Engl 218 or 219) .....			3
Traditional Logic/Modern Logic (Phil 221 or 222) .....	3		
Cultural Anthropology (Ant 201) .....		3	
General Psychology (Psy 202) .....			3
Electives .....	3	3	7
	17	17	16
Junior			
Intermediate Micro/Macro Economics (Econ 311, 312, 313) .....	4	4	4
Business Law Survey (Bus 201) .....	3		
Economic Geography (Geog 315) .....			3
American Government (PolS 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Economics elective (Econ 304 or 325 or 401) .....		3	
American Economic History (Econ 324) .....			3
Money, Banking and Credit (Econ 337) .....	4		
*** Electives and courses to complete major .....	3	6	3
	17	16	16
Senior			
Cost-Benefit Analysis (Econ 410) .....	3		
Monetary and Fiscal Policy (Econ 414) .....	4		
Development of Economic Analysis (Econ 317) .....		3	
Senior Project (Econ 461, 462) .....	2	2	
Undergraduate Seminar (Econ 463) .....			2
*** Electives and courses to complete major .....	6	10	14
	15	15	16

See COURSES OF INSTRUCTIONS section of this catalog for descriptions of courses in Economics and other subjects.

\* To be selected in accordance with the General Education requirements.

\*\* Students in the Quantitative Concentration take Math 141, 142, 143, and Stat 321, 322 in lieu of the above mentioned courses.

\*\*\* 18 to 19 units to be selected in a field of concentration.

# MANAGEMENT DEPARTMENT

Department Head, Melvin E. McMichael

Allan S. Baillie  
Sara A. Behman  
Milton Drandell  
Geraldine B. Ellerbrock

James B. Lau  
Robert H. McIntire  
Ernest C. Miller  
Rolf E. Rogers

Owen L. Servatius  
Robert F. Williams  
Paul Zivkovich

The objectives of the Management Department are to provide knowledge and skills of modern management theory and practice through the study of subjects critical to management performance (including general management, industrial relations, and management information systems); to develop in the student knowledge and skills of a second area or function to facilitate initial employment and subsequent career development; to help the student to acquire an appreciation of cultural, economic, political and technological trends which affect the role of managers in contemporary society; to help professionally-oriented students use theories, concepts, research findings, problem-solving techniques and analytical skills in management situations; and to provide a broad background and generalist viewpoint by encouraging study of individual courses in several knowledge and skill areas (including labor, economics, and social and political science).

The degree awarded is the Bachelor of Science in Business Administration with concentrations in Industrial Relations, International Business Management, Management, and Management Information Systems.

## CURRICULAR CONCENTRATIONS

### Industrial Relations

The two areas of interest within this concentration relate to labor-management relations and personnel management.

### International Business Management

This concentration is designed to provide the student the opportunity to develop proficiency in the subject matter basic to an occupational goal in the management of international/multinational operations. It provides cultural understanding, organizational knowledge and analytical skill central to international business management.

### Management

This concentration stresses the managerial process and decision making fundamental to all levels and functional areas of the business and industrial enterprise. The management program offers both quantitative and general management emphases to satisfy the individual needs of the student relative to business or academic ambitions.

### Management Information Systems

This concentration is designed to prepare students for careers involving the analysis, design, and operation of business information systems within industry and government. It provides training and practice in administrative data processing and in the analysis of managerial information requirements.

## CURRICULUM IN MANAGEMENT

Freshman	F	W	S
The Business Enterprise (Bus 101) .....	4		
English Composition (Engl 114, 115) .....	4	4	
Principles of Speech (Sp 200) .....			3
* Humanities elective .....			3
Physical Education activity .....		1	
Health Education (PE 250) .....	2		
* Natural Sciences .....	4	4	4

\* To be selected in accordance with the General Education requirements.

	F	W	S
Finite Mathematics (Math 121) .....		3	
Calculus for Business and Economics (Math 221) .....			4
Principles of Business Data Processing (CSc 120) .....			3
Electives and courses to complete the major .....	3	4	
	17	16	17
<b>Sophomore</b>			
Micro/Macro Economics (Econ 221, 222) .....	4	4	
Principles of Accounting (Actg 221, 222) .....	4	4	
American Democracy and World Affairs (Hist 206) .....			5
** Social Sciences .....		3	3
Traditional Logic/Modern Logic (Phil 221, 222 or 331) .....			3
* Natural Sciences .....	3		
Statistical Inference for Management I (Stat 251) .....	3		
Statistical Inference for Management II (Stat 252) .....		3	
Business Law (Bus 207) .....			4
Written Communication (Engl 300, 304 or 310) .....			3
American Government (PolSc 201) .....		3	
Electives and courses to complete the major .....	3		
	17	17	18
<b>Junior</b>			
Human Resources Management (Mgt 314) .....	4		
Organizational Behavior (Mgt 317) .....			4
Managerial Accounting (Actg 301) .....	4		
Financial Management (FPM 342) .....		4	
Marketing Analysis (Mktg 301) .....	4		
Organization and Management Theory (Mgt 312) .....	4		
Money, Banking and Credit (Econ 337) .....		4	
Quantitative Business Analysis and Applications of Data Processing (Mgt 321) .....		4	
Production and Operations Management (Mgt 325) .....			4
***Electives and courses to complete the major .....		4	8
	16	16	16
<b>Senior</b>			
* Literature .....	4		
Business Strategy and Policy Seminar (Mgt 414) .....			4
Business Research (Bus 419) .....		3	
Senior Project (Bus 460) .....			2
Government and Social Influences on Business (Bus 404) .....	4		
***Electives and courses to complete major .....	8	13	10
	16	16	16

All of the above courses except the electives are common to the Business Administration Department, Management Department, and Accounting Department curricula required for the B.S. in Business Administration.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Accounting, Business, Economics, Finance and Property Management, Management, Marketing and other subjects.

\* To be selected in accordance with the General Education requirements.

\*\* Select two from the following courses: Geog 315, Ant 201, Soc 105 or Psy 202.

\*\*\* 27 units of concentration electives must be chosen with approval of the adviser.

School of Communicative  
Arts and Humanities





## SCHOOL OF COMMUNICATIVE ARTS AND HUMANITIES

Jon M. Ericson, Dean  
Thomas V. Johnston, Associate Dean

The School of Communicative Arts and Humanities provides a record of man's experience and potential as a creative, imaginative, and reflective being. The school seeks to help each student to understand self and society. The school seeks to relate itself to the technological disciplines in a way that will help contribute to the solution of human problems. Accordingly, a wide range of courses is offered to serve every thoughtful man and woman without regard to specialized professional interests. These include humanities courses which supplement the various departmental offerings in the School and are offered under the direction of a Humanities Coordinator. The courses aim to heighten the student's sense of the interdisciplinary nature of humanistic studies and to increase awareness of humanistic values.

Programs leading to the bachelor's degree are offered in Applied Art and Design, English, Graphic Communications, History, Journalism, and Speech Communication. The Master of Arts degree is offered in English. Substantial course offerings are included in the departments of Foreign Languages, Music, and Philosophy. Strong cocurricular programs are found in Theatre, Forensics, Journalism, and Music.



# ART DEPARTMENT

Department Head, Thomas V. Johnston

Donald Bjorkman  
Bernard W. Dusek  
Clarissa Hewitt  
Robert Howell

Charles W. Jennings  
Helen P. Kelley  
Bernice B. Loughran  
Christina Orr-Cahall

Pierre C. Rademaker  
Robert G. Reynolds  
Henry Wessels

The Art Department offers a four-year curriculum leading to the Bachelor of Science Degree in Applied Art and Design. The curriculum prepares students for professional participation in the fields of crafts design or graphic design.

Crafts design students are prepared for professional careers as artist-craftsmen capable of designing, executing, and marketing works of limited edition or mass-produced character. Areas of emphasis are ceramics, metals, and wood.

Graphic design students are prepared for professional careers in advertising design, editorial design, illustration and related areas. The curriculum emphasizes creative problem-solving, and addresses the development of specific skills in the design, layout, and execution of graphic problems with supportive knowledge of reproduction limitations. Graphic design students have the unique opportunity, through course offerings in photography and graphic communications, to gain practical experience in production methods.

Both the crafts design and graphic design options support creative and aesthetic growth and require the development of technical skills as a foundation for personal direction and enrichment.

The Department recognizes that art, crafts and design are increasingly relevant to many occupational fields. Accordingly, art prefix courses are frequently required within various university majors and the Art Department provides this service through a strong and diversified program.

In addition to the major and support programs, general education courses are available for all students who wish to enrich their understanding, appreciation, and practical skills in the areas offered within the Art Department.

## CURRICULUM IN APPLIED ART & DESIGN

Freshman	F	W	S
Fundamentals of Drawing (Art 101) .....	3		
Design Fundamentals (Art 231, 232, 233) .....	3	3	3
Functions of Design (Art 234) .....	3		
Basic Accounting (Actg 131) .....		3	
English Composition (Engl 114, 115) .....		4	4
General Psychology (Psy 202) .....	3		
* Physical Science .....		4	4
Math for General Education (Math 100) .....			3
Physical Education .....	1		1
Electives .....			2
Courses to complete major .....	4	3	
	17	17	17
Sophomore			
Basic Photography (Art 221) .....	3		
Ceramics (Art 245) .....	3		
Metalsmithing (Art 255) .....		3	
Wood Design (Art 250) .....			3
Art History (Art 211, 212 or 213) .....		4	4
Advanced Drawing (Art 301 or 302) .....	3		
Marketing Principles (Mktg 204) .....			4
American Government (Pol Sc 201) .....		3	

\* To be selected with adviser approval in accordance with General Education requirements.

	F	W	S
Survey of Economics (Econ 201).....	3		
General Biology (Bio 101).....	3		
Principles of Speech (Sp 200) .....			3
Health Education (PE 250).....		2	
* Humanities .....		3	
Courses to complete major.....	<u>1</u>	<u>3</u>	<u>3</u>
	16	15	17
<b>Junior</b>			
Contemporary Art (Art 312) .....	3		
Display and Exhibition Design (Art 336) .....			2
Professional Practice in Art (Art 381) .....		2	
Cultural Anthropology (Ant 201) .....	3		
* Natural Science .....		4	
* Literature .....			4
* Literature/Philosophy.....			3
American Democracy and World Affairs (Hist 206) .....		5	
Electives .....			5
Courses to complete major.....	<u>10</u>	<u>6</u>	<u>2</u>
	16	17	16
<b>Senior</b>			
Senior Project (Art 461, 462) .....		2	2
Undergraduate Seminar (463, 464) .....	2	2	
Studio Practices (Art 481) .....	3		
History of Western Civilization (Hist. 101, 102) .....	3	3	3
** Electives .....	4	4	12
Courses to complete major.....	<u>5</u>	<u>5</u>	<u>17</u>
	17	16	17

### CRAFTS DESIGN OPTION

(Add Courses Below to Basic Curriculum)

<b>Freshman</b>		
Engineering Drawing Systems (ETME 142)..... (2)	Ceramics (Art 345) .....	(3)
Industrial Wood Processes (IT 125) .... (2)	Plastics Design (Engr 302).....	(2)
Manufacturing Processes Fundamentals (ETMP 127) .....		
	<b>Senior</b>	
	History of Crafts (Art 314) .....	(3)
<b>Junior</b>	***Advanced Crafts (Art 450, 451, 452, 455, 456, 457 or Art 445, 446, 447)....	(9)
Metalsmithing (Art 355)..... (3)	Crafts Design/Production (Art 482) .....	(5)
Wood Design (Art 350) .....	Crafts Marketing (Art 483) .....	(2)

### GRAPHIC DESIGN OPTION

(Add Courses Below to Basic Curriculum)

Freshman		Junior	
Graphic Art Processes (GrC 127) .....	(3)	Graphic Design (Art 331, 332, 333) .....	(9)
Introduction to Drawing and Perspective (EDes 111) .....	(3)	Printmaking (Art 207) .....	(3)
		Design with Type (GrC 122) .....	(6)
Sophomore		Senior	
Copy Preparation (GrC 223) .....	(3)	Advanced Graphic Design (Art 431, 432, 433) .....	(9)
		Preseparated Art for Camera (GrC 323) .....	(3)

\* To be selected with advisor approval in accordance with General Education requirements.

\*\* Restricted elective. To be chosen from: Engl 251, Sp 215, Mu 404, 405, 406, or Th 327, 328.

\*\*\* To be selected with advisor approval.

# ENGLISH DEPARTMENT

Department Head, Robert F. McDonnell

Elizabeth B. Anderson	Miles B. Johnson	James J. Peterson
Stanley L. Barr	David J. Kann	David R. Rollings
Patricia A. Brenner	Brent H. Keetch	Mona G. Rosenman
Edward A. Cairns	John F. Kerr	Habib Sheik
Gordon Curzon	Alfred Landwehr	James E. Simmons
Max E. Darnielle	Donald P. Lazere	Douglas B. Smith
Arthur H. Fietzsche	Charles H. Lindamood	Charles W. Strong
John F. Harrington	Robert G. Lint	Gerald J. Sullivan
Robert J. Huot	Nancy Lucas	William B. Wahl
Gloria Jameson	Martin L. Luschei	Isaac N. Walker
Starr Jenkins	John H. Mott	Michael J. Wenzl
Mead R. Johnson	Michael P. Orth	

The English Department serves students through courses in writing, in literature, and in linguistics. The aim of the department is to provide students with greater expressive power, and with understanding and appreciation of literature. The department also endeavors to develop in students abilities valuable in the professional and business world and in private life: the abilities of reading critically, of organizing a large body of information, and of expressing the results in clear, forceful prose.

The department offers general education courses, courses for elective credit, and BA and MA programs. An English major is valuable as preparation for law, for business, and for other careers in which handling and expressing ideas are essential.

## CURRICULUM IN ENGLISH

Freshman	F	W	S
English Composition (Engl 114, 115) .....	4	4	
Introduction to Genres (Engl 204) .....			4
Introduction to Shakespeare (Engl 233) .....			3
Physical Education Activity .....	1	1	
Health Education (PE 250) .....	2		
§ Mathematics for General Education (Math 100) .....		3	
History of Western Civilization (Hist 101, 102, 103) .....	3	3	3
* Natural Science .....	3	3	3
Introduction to Philosophy (Phil 101) .....			3
Electives .....	1	1	
	14	15	16
Sophomore			
Great Books of the Western World (Engl 251) .....	3		
Advanced Composition (Engl 304) or Literary Criticism (Engl 326) ..	4		
Creative Writing (Engl 325) .....		4	
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
* Natural Science .....	3	3	
Cultural Anthropology (Ant 201) .....			3
General Psychology (Psy 202) .....			3
** Social Sciences .....			3

§ Students preparing for an Elementary Credential should take Math 327 and 328.

\* A minimum of 15 units of natural science is required for graduation. [See General Education Requirement. The department recommends Agriculture and American Life (Ag 301) and Technology in the 20th Century (Engr 301).]

\*\* To be selected in accordance with the General Education requirements.

	F	W	S
Introduction to Linguistics (Engl 290) .....		4	
Principles of Speech (Sp 200) .....			3
† Electives .....	3	2	1
	16	16	16
<b>Junior</b>			
American Literature (Engl 340 or 341 or 342) .....		4	4
Modern English Grammar (Engl 390) .....	4		
British Literature (Engl 330 or 331 or 332) .....	4		
British Literature (Engl 333 or 334) .....		4	
History of the English Language (Engl 395) .....			4
Modern Novel (Engl 350) or Modern Poetry (Engl 351) or Modern Drama (Engl 352) .....	4		
Literature elective (200 series) .....		3	
Oral Interpretation (Sp 305) .....			4
** Art, Music, or Theatre .....		3	
Computers and Computing (CSc 110) .....	3		
† Electives .....		2	4
	15	16	16
<b>Senior</b>			
Chaucer (Engl 430) or Shakespeare (Engl 431) or Milton (Engl 432) .....	4	4	
Significant British Writers (Engl 439) or Significant American Writers (Engl 449) or Significant World Writers (Engl 459) .....		4	4
English elective (400 level) .....	4		
English elective (330 or 331 or 332 or 333 or 334 or 340 or 341 or 342) .....			4
Senior Project (Engl 461) .....	2		
† Electives .....	6	8	6
	16	16	14

## CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For University requirements see the *Graduate Studies Announcement*)

Required:	Units
Engl 502 Introduction to Critical Analysis .....	3
Engl 503 Contemporary Language Study .....	3
Engl 504 Problems in Language .....	3
Engl 505 Problems in Composition .....	3
Engl 511 Problems in American Literature .....	6
Engl 512 Problems in British Literature .....	6
Engl 590 Graduate Seminar in English .....	3
Additional units in the Engl 400 and 500 series, selected with advisory committee approval. At least 3 units must be Engl 504, 511, or 512 .....	9
Elective units which may be in other disciplines, selected with advisory committee approval .....	9
Total Units .....	45
See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in English and other subjects.	

† At least 9 of the elective units must be from the following courses: Th 327, 328; Hist 311, 312, 313; 404, 405, 406; Phil 311, 312, 313, 315; or Sp 215.

\*\* To be selected accordance with the General Education requirements.

## FOREIGN LANGUAGES DEPARTMENT

Department Head, Verlan H. Stahl

Odile Clause

Daniel Najera

Bianca Rosenthal

Claudio Y. Silva

Instruction in French, German, and Spanish is offered to prepare the student for specific technical, vocational, literary, and cultural needs at home and abroad. Recognition of achievement is guaranteed by completion of a two-year Certificate of Proficiency program, which consists of thirty quarter units plus a comprehensive examination.

Opportunity for study of languages other than French, German, and Spanish is provided through Foreign Language 101, 102, 103. The subject matter and teaching methods used provide a usable, practical knowledge of the language studied.



# GRAPHIC COMMUNICATIONS DEPARTMENT

Department Head (Acting), Joseph W. Truex

Herschel L. Apfelberg  
James H. Babb  
Eugene F. Coleman  
Charles E. Decker

Peter R. Del Vaglio  
James R. Hutchinson  
W. Stephen Mott

Philip K. Ruggles  
Guy H. Thomas, Jr.  
John B. Wordeman

The Graphic Communications Department offers a four-year curriculum leading to the Bachelor of Science degree. The curriculum is designed to prepare graduates for positions of responsibility in the printing, publishing, and packaging industries.

The program provides courses in general education together with a core of printing technology courses. Courses which are specific to one of the curricular options are also provided. The student is introduced to all stages of the printing processes, and chooses a specialized option in the graphic communications field at the appropriate time. The program is not designed to provide vocational training for machine operators. Rather, students are educated for leadership as managers and other skilled professionals who are well grounded in printing technology.

The Graphic Communications Department occupies 33,000 square feet of floor space in the modern Graphic Arts Building. Theory and practice are taught in modern classrooms incorporating the latest in teaching aids. Ten, well-equipped laboratories of printing equipment provide the student with diverse experience in the practical aspects of the industry.



## CURRICULAR OPTIONS

### Computer Graphic Communications

This option is designed for the printing major who wishes a career in which computer applications are given prominence. The option prepares the student for careers in computer typography, estimating, scheduling, production management, quality control, and graphic terminal displays.

### Design Reproduction

The Design Reproduction option prepares talented students for employment in a wide variety of design-related positions in graphic communications, such as art production, publication design, typography, and the mechanical preparation of art and copy. The program combines a broad technological background in the graphic arts with the principles of design.

### Packaging

This option is designed for the student who desires a career in the growing field of packaging. The program provides a basis for the analysis of problems in package design, technology, and management in both consumer and industrial packaging.

### Printing Management

This option is designed as a flexible program for the student interested in pursuing employment as a printing plant manager, planner, quality control specialist, production control specialist, estimator, or sales representative. The program also prepares the student for employment as a technical representative for manufacturers of graphic arts machinery and supplies.

## CURRICULUM IN GRAPHIC COMMUNICATIONS

Freshman	F	W	S
Introduction to Graphic Communications (Gr C 101) .....	2		
Substrates and Ink (Gr C 111) .....			4
Design with Type (Gr C 122) .....		5	
Binding and Finishing (Gr C 123) .....			3
Letterpress (Gr C 132) .....		3	
English Composition (Engl 114) .....	4		
Technical Writing (Engl 219) .....			3
Pre-Calculus Algebra (Math 118) .....	4		
* Natural Sciences .....	4	4	4
Approved Computer Science Course .....		3	
General Psychology (Psy 201 or 202) .....			3
Physical Education activity .....	1	1	1
Health Education (PE 250) .....		2	
	15	18	18
Sophomore			
Introduction to Printing Management (Gr C 204) .....	3		
Copy Preparation for Reproduction (Gr C 223) .....		3	
Composing Machines (Gr C 224) .....	4		
Process Camera (Gr C 227) .....	5		
Image Assembly and Platemaking (Gr C 228) .....		4	
Offset Lithographic Presswork (Gr C 229) .....			5
Relief Printing Specialties (Gr C 233) .....			3
Life Science .....			3
Basic Photography (Art 221) .....	3		
* Business Law Survey (Bus 201) .....			3
* Literature .....		4	
Approved Art course .....	3		
Principles of Economics (Econ 211) .....		3	
Courses to complete major (depending on option) .....		0-3	0-3
Electives .....		0-4	0-3
	18	18	17
Junior			
Composition Systems (Gr C 301) .....	4		
Printing Equipment Management (Gr C 326) .....			3
Estimating (Gr C 303) .....			3
Great Books of the Western World (Engl 251, or 252, or 253) .....			3
Plant Organization and Layout (Gr C 333) .....			3
Screen Processes (Gr C 357) .....	2		
American Government (Pol Sc 201) .....	3		
American Democracy and World Affairs (Hist 206) .....		5	
Courses to complete major (depending on option) .....	4-6	8-10	3-6
Electives .....	0-2	0-1	0-2
	15	15	17
Senior			
Web Printing (Gr C 416) .....		5	
Printing Management (Gr C 421, 422) .....	4	3	
Senior Project (Gr C 461) .....	2		
History of Science and Technology (Hist 306) .....			3
Ethics (Phil 331) .....			3
Principles of Speech (Sp 200) .....	3		

\* To be selected with adviser approval in accordance with the General Education requirements.



	F	W	S
Traditional Logic (Phil 221) .....	3		
Courses to complete major (depending on option) .....	3-8	3	7-9
Electives .....	0-5	1	0-2
	20	12	15

## COMPUTER GRAPHIC COMMUNICATIONS OPTION

(Add courses below to basic curriculum)

Junior	Senior
GrC 302 Technical Basics for Printing (3)	GrC 429 Advanced Composition Systems (3)
CSc 221 Computer Principles and Programming (3)	CSc 345 Data Structures (3)
CSc 222 Digital Computer Symbolic Programming (3)	CSc 452 Computer Programming Systems (3)
CSc 306 Minicomputers (3)	CSc 255 Computer Graphics Applications (3)
CSc 310 Programming Language/One (PL/1) (3)	ETEL 124 Introduction to DC Circuits (4)
IE 214 Production Control (2)	Mgt 418 Quantitative Methods and Controls in Business (3)

## DESIGN REPRODUCTION OPTION

(Add courses below to basic curriculum)

Sophomore	Senior
Art 232-3 Design Fundamentals (6)	Art 331-2-3 Graphic Design (9)
GrC 323 Pre-Separated Art for Camera (3)	GrC 439 Advanced Line and Halftone Media (5)
GrC 335 Line and Halftone Media (5)	Art 431-2-3 Adv. Graphic Design (9)

## PRINTING MANAGEMENT OPTION

(Add courses below to basic curriculum)

Junior	Senior
Gr C 302 Technical Basics for Printing (3)	GR C 312 Theory of Lithography (3)
Actg 131, 132 Basic Accounting (6)	Gr C 401 Printing Sales (4)
Econ 212 Principles of Economics (3)	Gr C 408 Newspaper and Publications Management (3)
CSc 255 Computer Graphics Applications (3)	Gr C 411 Estimating, Pricing and Costing (4)
Stat 211 Elementary Probability and Statistics (3)	Gr C 423 Printing Management (4)
Mktg 204 Marketing Principles (4)	

## PACKAGING OPTION

(Add courses below to basic curriculum)

Sophomore	Senior
Actg 131-2 Basic Accounting (6)	GrC 401 Printing Sales (4)
GrC 302 Technical Basics for Printing (3)	GrC 431 Package Estimating (3)
GrC 330 Packaging Substrates (3)	GrC 437 Consumer Packaging (3)
FdSc 230 Elements of Food Processing (4)	IT 408 Industrial Packaging (3)
IT 327 Plastics Technology (2)	IT 409 Package Machinery (3)
Mktg 204 Marketing Principles (4)	

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Graphic Communications and other subjects.

# HISTORY DEPARTMENT

Department Head, Robert E. Burton

Timothy M. Barnes	Daniel E. Krieger	Robert L. Rosenberg
Lloyd N. Beecher	Scott J. Maughan	John G. Snetsinger
James L. Fitts	Edward L. Mayo	Shirlene A. Soto
Donald A. Grinde, Jr.	Barton C. Olsen	Quintard Taylor, Jr.
Barbara M. Hallman	Max E. Riedlsperger	Herman C. Voeltz
Donald W. Hensel	Joseph B. Romney	

The History Department serves all schools of the University by offering general education courses in American democracy and world affairs. The Department offers a Bachelor of Arts degree built on a broad social science and humanities base. In addition, the History Department offers a broad range of courses in Latin America, East Asia, Africa, and the Middle East. Ethnic study courses are offered in Afro-American, Chicano, and Indian history.

The History major provides strong preparation for elementary and secondary teaching and for employment in government and business.

## CURRICULUM IN HISTORY

Freshman	F	W	S
History of Western Civilization (Hist 101, 102, 103) .....	3	3	3
English Composition (Engl 114, 115) .....		4	4
Physical Education Activity .....	1	1	1
* Natural Science .....	3	3	3
National and California Government (Pol Sc 101, 102) .....	3	3	
Introduction to International Relations (Pol Sc 105) .....			3
Mathematics for General Education (Math 100) .....	3		
Health Education (PE 250) .....		2	
Historical Craft (Hist 221) .....	3		
Electives .....			2
	16	16	16
Sophomore			
United States History (Hist 201, 202, 203) .....	3	3	3
* Natural Science .....		3	3
Economics (Econ 211 or 201) .....	3		
Principles of Sociology (Soc 201, 202) .....	3	3	
Principles of Speech (Sp 200) .....		3	
Logic (Phil 221) or Argumentation (Sp 215) .....	3		
Cultural Anthropology (Ant 201) .....			3
General Psychology (Psy 202) .....	3		
World Prehistory (Ant 202) .....		3	
Electives .....			6
	15	15	15

\* To be selected in accordance with the General Education requirements.

Junior	F	W	S
Historiography (Hist 301).....	3		
U.S. In World Affairs (Hist 205) .....			3
U.S. History at 300-400 level.....	3	6	3
* Literature.....	4	4	
* Philosophy .....			3
***Restricted electives .....	3	3	3
** Electives .....	3	3	4
	16	16	16
Senior			
Senior Project (Hist 460).....	2		
European History at 300-400 level .....		3	3
History at 300-400 level .....	6	3	6
Ant/Econ/Geog/Pol Sc/Psy/Soc Sc/ (300-400) .....		3	3
* Humanities .....	3		
** Electives .....	4	6	3
	15	15	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in History and other subjects.

\* To be selected in accordance with the General Education requirements.

\*\*\* Nine units to be taken from the following courses: Engl 251, 252, 253; Mu 404, 405, 406; Th 327, 328; Phil 311, 312, 313, 315; Jour 118.

\*\* At least 16 units must be at the 300-400 level. Two years of foreign language are highly recommended.

# JOURNALISM DEPARTMENT

Department Head,

James H. Hayes  
John R. Healey

Robert A. Logan  
Randall L. Murray

Ed J. Zuchelli

The Journalism Department offers a professional program leading to the Bachelor of Science Degree in Journalism. All journalism majors must complete the basic journalism curriculum, which includes courses in the journalism core and supplementary courses in the humanities, natural sciences, and social sciences. Each major must also complete a specified number of required and elective courses in one of the following concentrations: Agricultural Journalism, Broadcast Journalism, News-Editorial, Photojournalism, or Public Relations-Advertising.

No more than 50 credits of the 198 applied toward the degree may be in journalism or related communications courses unless the student takes more than 198 credits to maintain the 1:3 credit ratio between journalism and related courses.

All journalism majors are expected to serve as staff members of departmental communications media, including Mustang Daily, the student newspaper; or KCPR, the FM-stereo radio station. They are also expected to participate in professional and scholarly organizations in their interests. The department sponsors student chapters of the Society of Professional Journalists, Sigma Delta Chi; the National Press Photographers Association; and the Agricultural Communicators of Tomorrow.

## CURRICULAR CONCENTRATIONS

### Agricultural Journalism

Prepares for farm or farm-city careers in reporting and editing, radio and television news; public relations and publicity; advertising copywriting, and layout. Twenty-nine of the elective units must be chosen with the approval of the adviser.

### Broadcast Journalism

Prepares students for careers as reporters and newscasters for radio and television. Emphasizes the acquisition of knowledge and skills necessary for initial employment upon graduation as well as those necessary for future growth to positions of responsibility in the news and public affairs aspects of the electronic media.

### News-Editorial

Prepares students for reporting and editing jobs on the staffs of newspapers and wire services. Emphasizes acquisition of knowledge and skills necessary for initial employment upon graduation as well as those necessary for future growth to positions of responsibility in print media.

### Photojournalism

Prepares students to work as photographer-reporters for newspapers, magazines, and television. Emphasizes the acquisition of knowledge and skills in color as well as black and white photography.

### Public Relations-Advertising

Prepares students for business, governmental, and institutional positions in advertising and public relations. Emphasizes the acquisition of knowledge and skills needed for future growth into management positions with the communications media and other institutions.

## CURRICULUM IN JOURNALISM

Freshman †	F	W	S
Journalism in Society (Jour 118) .....	3		
English Composition (Engl 114, 115) .....	4	4	

† Unless already acceptable typists, majors will be required to attain typing proficiency during their freshman year.

	F	W	S
Introduction to Human Relations in Business (Mgt 118) (Spring) .....			3
Mathematics (Math 100 or 102) .....		3	
Life Science .....	3		
Natural Science .....		3	3
Reporting (Jour 203) .....			3
Introduction to Sociology (Soc 105) .....			3
Health Education (PE 250) .....	2		
Physical Education activity .....		1	1
*§ Electives and courses to complete major .....	6	5	3
	18	16	16

#### Sophomore

Journalism History (Jour 201) .....	3		
Basic Photography (Art 221) .....		3	
Introduction to Philosophy (Phil 101) .....			3
Communication Theory (Sp 214) .....			4
Reporting II (Jour 304) .....		3	
Physical science .....	3		
Natural science .....			3
Survey of Economics (Ec 201) .....	3		
American Government (Pol Sc 201) .....	3		
American Democracy and World Affairs (Hist 206) .....		5	
General Psychology (Psy 202) .....			3
Principles of Speech (Sp 200) .....			3
Physical Education activity .....			1
*§ Electives and courses to complete major .....	5	6	
	17	17	17

#### Junior

Introduction to Conservation (Cons 311) .....		3	
American Political Processes (Pol Sc 302) .....			3
American Literature (Engl 340) .....	4		
Advanced Composition—Nonfiction (Engl 304) .....	4		
Global Geography (Geog 308) .....	3		
Literature/philosophy elective .....		3	
Humanities elective .....			3
Urban Sociology (Soc 313) .....			3
*§ Electives and courses to complete major .....	6	12	9
	17	18	18

#### Senior

Municipal Government (Pol Sc 403) .....	3		
Senior Project (Jour 460) .....	3		
Media Internship (Jour 444) .....	4		
Law for Journalists (Jour 302) .....		3	
*§ Electives and courses to complete major .....	3	13	15
	13	16	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Journalism and other subjects.

\* 9 elective units must be chosen from the following courses: Engl 251, 252; Hist 101, 102, 103; Mu 205, 206, 207; Sp 215; Phil 311, 312, 313.

§ 29 of the elective units must be taken in a field of concentration.

## MUSIC DEPARTMENT

Department Head, Bessie R. Swanson

George C. Beatie  
James C. Dearing  
William V. Johnson

Ronald V. Ratcliffe  
John Russell

Clifton E. Swanson  
Graydon Williams

Through its courses and activities, the Music Department provides opportunities for personal enrichment to students from all other departments of the University. It offers students with an interest in music a broader insight into the general field of music through courses in appreciation, theory, harmony, and music history; it gives musically inclined students the opportunity to participate in University musical organizations and to further their proficiency both in singing and in playing instruments; and it provides the prospective teacher with basic skills and instructional techniques in music required for the elementary credential.

The courses and activities of the Music Department are open to all qualified men and women students.



The Music Department also serves as a cultural center for both the University and community through a program of public performances by student and faculty groups and through department-sponsored concerts, clinics, workshops, and lectures by outstanding individuals from outside the University.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Music and other subjects.

## PHILOSOPHY DEPARTMENT

Department Head, Kendrick W. Walker

Arthur C. W. Bethel  
Stanislaus J. Dundon

Russell A. Lascola  
Frederick J. O'Toole

Judy D. Saltzman  
M. Dolores Sweet

The courses offered by the Philosophy Department are intended to provide an opportunity for students to examine fundamental questions about the human condition, and the importance of those questions to historical, scientific, religious, and social issues. These courses will acquaint the student with the problems of logic (the nature of argument), metaphysics (the nature of reality), epistemology (the nature and limits of human knowledge), and axiology (the nature of what is right or worthwhile), and with the historical development of these problems and the proposed solutions to them. The Philosophy Department also offers courses examining the patterns of belief and worship in the world's major religions. All these courses provide the student with an opportunity to participate in philosophical discussion and to develop proficiency in critically examining philosophical positions, with a view to enabling the student to develop a personal philosophy and a more comprehensive view of the world.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Philosophy and other subjects.

# SPEECH COMMUNICATION DEPARTMENT

Department Head, Harry Sharp, Jr.

Robert L. Andreini  
Robert L. Cleath  
James R. Conway  
James R. Emmel

David R. Henry  
Michael R. Malkin  
Pamela C. Miller  
Keith E. Nielsen

James W. Reed  
J. Murray Smith  
Joyce H. Wright

The Speech Communication Department, through its courses in speech and theatre, serves the entire University. Its offerings enable students to fulfill requirements in general education, prepare for communication-centered careers, and/or enhance both cultural awareness and individual potentials.

The objectives of the Speech Communication Department are to teach the composite knowledge and skills of the communication arts and sciences, both for students preparing for communication-oriented careers and for prospective teachers in the public schools.

The Speech Communication Department offers both an academic major and a teacher certification program. All majors must complete a basic core curriculum. Then they consult with their advisors to choose a program of appropriate support courses in speech, theatre, and related subjects. The total program of the Speech Communication Department is geared not only toward a broad theoretical knowledge of the discipline but also toward providing many opportunities for participation in a variety of communication-related activities.

Many cocurricular activities are available for students interested in the speech arts. Intercollegiate forensic tournaments provide opportunities for Cal Poly speakers to compete with students from other universities and colleges in debate and other speech events. The University theatre program annually presents a full season of plays. Additional student activities include public speaking, oral interpretation, and readers theatre presentations to campus and community audiences.

## CURRICULUM IN SPEECH COMMUNICATION

Freshman	F	W	S
Professional Fields of Speech (Sp 111) .....	1		
Principles of Speech (Sp 200) .....	3		
Voice and Articulation (Sp 206) .....		3	
Forensic Activity (Sp 250) .....		1	
Essentials of Discussion (Sp 217) .....			4
English Composition (Engl 114 or 115) .....		4	
Mathematics (Math 100) or Elementary Probability and Statistics (Stat 211) .....	3		
Natural Sciences (include Ag 301, Engr 301) .....	3	3	3
Health Education (PE 250) .....	2		
Physical Education activity .....			1
General Psychology (Psy 202) .....	3		
* Electives .....		4	8
	15	15	16

\* In accordance with policy adopted by the School of Communicative Arts and Humanities, a total of 9 elective units shall be chosen from the following courses, none of which may also be credited toward completion of the major: Engl 251, 252, 253; Jour 118; Mu 404, 405, 406; Phil 311, 312, 313, 315; Sp 215; Th 327, 328.

Sophomore	F	W	S
Communication Theory (Sp 214) .....			4
Introduction to Theatre (Th 220) .....	3		
Acting (Th 320) .....	3		
Advanced Forensic Activity (Sp 350) .....	2		
Life Science .....		3	
Physical Science .....			3
Literature .....	3		
Phonetics (Sp 306) .....		3	
History of Western Civilization (Hist 101, 102, 103) .....	3	3	3
Physical Education activity .....	1		1
** Support Courses .....		4	4
* Electives .....		3	
	15	16	15
Junior			
Advanced Composition (Engl 300) .....	3		
Persuasion (Sp 304) .....		4	
Oral Interpretation (Sp 305) .....			4
Rhetoric (Sp 317) .....	4		
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
United States in World Affairs (Hist 205) .....			3
Cross Cultural Communication (Sp 311) .....	3		
† Philosophy .....			3
Rhetorical Criticism (Sp 319) .....		4	
* Electives .....	3	4	5
	16	15	15
Senior			
Organizational Communication (Sp 403) .....		3	
Communication Research (Sp 411) .....	4		
† Social Science .....	3		
Senior Project (Sp 461) .....		2	
Undergraduate Seminar (Sp 463) .....			2
** Support Courses .....		4	7
Theatrical History and Literature (Th 327, 328) .....		4	4
or Argumentation (Sp 215) .....			
and American Public Address (Sp 408 or 409) .....			
* Electives .....	9	3	3
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Speech, Theatre and other subjects.

\*\* Seventeen units from courses chosen with approval of student's adviser; minimum of 15 units of 300-400 level.

\* In accordance with policy adopted by the School of Communicative Arts and Humanities, a total of 9 elective units shall be chosen from the following courses, none of which may also be credited toward completion of the major: Engl 251, 252, 253; Jour 118; Mu 404, 405, 406; Phil 311, 312, 313, 315; Sp 215; Th 327, 328.

† To be selected in accordance with General Education requirements.



# School of Engineering and Technology



# CHART OF RECOMMENDED COMMUNITY COLLEGE PREPARATION FOR ENGINEERING AND TECHNOLOGY CURRICULA CALIFORNIA POLYTECHNIC STATE UNIVERSITY, SAN LUIS OBISPO

CAL POLY MAJORS REQUIRING VARIOUS COURSES														
Recommended C.C. Preparation in Terms of Cal Poly Courses	Qtr. Units													
		Aero	CE	EE	EL	Eng&Sc	ET	EnvE	IE	IA	IT	ME	MET	
<i>Mathematics</i>														
Math 120, College Algebra and Trig.....	5						X	X		X	X			
Math 131, Technical Calc.....	4						X	X						
Math 132, Technical Calc.....	4						X	X						
Math 133, Technical Calc.....	4						X	X						
Stat 211, Elem Prob & Stat.....	3													
Math 141, Anal Geom & Calc.....	4	X	X	X	X	X		X						X
Math 142, Anal Geom & Calc.....	4	X	X	X	X	X		X						X
Math 143, Anal Geom & Calc.....	4	X	X	X	X	X		X						X
Math 241, Anal Geom & Calc.....	4	X	X	X	X	X		X						X
Math 242, Diff Equations.....	4	X	X	X	X	X		X						X
<i>Physics</i>														
Phys 121, College Physics.....	4						X	X		X	X			
Phys 122, College Physics.....	4						X	X						
Phys 123, College Physics.....	4						X	X						
Phys 131, Gen Phys.....	4	X	X	X	X	X		X						X
Phys 132, Gen Phys.....	4	X	X	X	X	X		X						X
Phys 133, Gen Phys.....	4	X	X	X	X	X		X						X
Phys 210, Intro to Modern Phys.....	4			X								X		
Phys 211, Modern Phys.....	4													
<i>Chemistry</i>														
Chem 121, Gen Inorg Chem.....	4													
Chem 122, Gen Inorg Chem.....	4						X			X	X			
Chem 124, Gen Chem.....	4		X	X	X	X		X						X
Chem 125, Gen Chem.....	4	X	X	X	X	X		X						X
Chem 126, Gen Chem.....	4													X
<i>Engineering &amp; Supporting Courses</i>														
Engg 101, Drafting.....	—	2	2	1	1	2	4	2	2	4	4	2	1	1
Engg 251, Digital Comp Appl.....	—	2	2	0	0	2	2	2	2	0	0	2	2	2
Mfg Processes.....	—	4	4	4	4	4	6	4	4	6	4	5	4	5
Strength of Mat.....	—	5	5	0	0	5	5	3	3	0	0	7	7	7
Engg Statics and Dynamics.....	—	7	7	7	7	7	7	7	7	0	0	0	0	0
Initial courses in Electricity and Electronics.....	—	4	4	7	7	4	7	4	4	5	16	4	4	4
Power Tech (IT 221), Tech Comp (IT 101), Mktg Prin (Mktg 204).....	—	0	0	0	0	0	0	0	0	6	6	0	0	0
Lower Division Lab Courses in Ind Arts.....	—	0	0	0	0	0	0	0	0	8	0	0	0	0
<i>General Education</i>														
Soc Sc (Psy 202, Pol Sci 201, Econ).....	—	9	9	9	9	9	9	9	9	9	9	9	9	9
Hist 204-5, Humanities (Lit, Phil, etc.).....	—	15	15	15	15	15	15	15	15	15	15	15	15	15
Miscellaneous: PE (3), Engl Comp & Writing (6), Life Science (3), etc.....	—	12	12	21	12	16	12	12	12	19	22	12	12	12
Maximum Transfer Units.....	—	105	105	105	105	105	105	105	105	105	105	105	105	105

# SCHOOL OF ENGINEERING AND TECHNOLOGY

Robert G. Valpey, Dean  
William F. Horton, Associate Dean

The Engineers' Council for Professional Development defines engineering as "the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind."

Engineering at Cal Poly is strongly oriented toward preparing young people for immediate entry into the practice of engineering in the industrial world upon graduation from one of the four-year bachelor's degree programs. Each student selects a major as a freshman and takes at least one course per quarter in that major from the first quarter at Cal Poly. This process increases motivation to master the mathematics, basic science, and engineering science which constitute a very important half of each engineering curriculum.

Engineering graduates of Cal Poly are in great demand and find an endless variety of engineering challenges awaiting them. They enter design, manufacturing, research, development, sales, maintenance, operation, etc. in industry, government, consulting firms, and many related activities. Many elect to go directly to graduate school. Increasing numbers find employment outside of the engineering profession in positions where an engineering education is either required or preferred.

Engineering curricula offered in the School of Engineering and Technology leading to the Bachelor of Science degree are: Aeronautical Engineering, Civil Engineering, Electrical Engineering, Electronic Engineering, Engineering Science, Environmental Engineering, Industrial Engineering, Mechanical Engineering, Metallurgical Engineering.

The School of Engineering and Technology also offers curricula leading to the Bachelor of Science degree in Engineering Technology and Industrial Technology and the Bachelor and Master of Arts in Industrial Arts. Both industrial arts degrees are offered by the Industrial Technology Department.

Engineering Technology is defined by the Engineers' Council for Professional Development as that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer.

Industrial technology is defined by the National Association of Industrial Technology as a baccalaureate degree program designed to prepare individuals for technical managerial, production supervisory, and related types of professional leadership positions.

Industrial Arts provides professional and credentialing preparation of future industrial education teachers for the secondary schools and community colleges.

*Attention is directed to the preceding chart on recommended junior college preparation for engineering and technology major curricula. This chart should be studied and followed in order to prevent loss of time in completing the program after transferring to Cal Poly. In addition the University grants credit for lower division work in accordance with provisions agreed upon in the Engineering Liaison Committee.*

*Engineering students must select their social sciences and humanities electives with a view to satisfying not only the general education requirement of the California State University and Colleges, but also the humanities and social sciences requirements of the Engineers' Council for Professional Development (ECPD). (No skills classes are acceptable.)*

## COOPERATIVE PROGRAMS

The School of Engineering and Technology offers cooperative work-study programs in which students gain practical experience by working in industry or government installations in a predetermined pattern of alternating periods of work and study. Under a cooperative program the students receive experience in their profession plus income during work periods.

In general, students under these programs will require more time to complete curriculum requirements, depending upon the time of starting and the nature of the individual's work-study plan. Cal Poly attempts to place students in programs which are to their best educational and financial advantage.

Students in a cooperative program are considered by Cal Poly to be continuing students while they are employed in industry. They may reside in Cal Poly housing during work periods and may attend student activities provided they pay the activity fee.

## MASTER OF ENGINEERING DEGREE

The Master of Engineering curriculum offers a broadly based program supported by all of the engineering departments of the university. It is designed as an interdisciplinary program for the generalist, and the project leader.

In more detail, the objectives of the program are to provide:

1. The appropriate job-entry education for the more complex areas of engineering such as research and development, innovative design, and systems analysis and design.
2. Both updating and upgrading opportunities for practicing engineers.
3. Appropriate graduate preparation for further graduate study in engineering.
4. Quality preparation for teachers of pre-engineering, engineering technology, and most aspects of undergraduate engineering curricula.
5. An excellent base for lifelong individual study by the graduate.

## CURRICULUM FOR THE MASTER OF ENGINEERING DEGREE

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>
Engineering courses in a primary engineering field—at least six units at 500 level ..	9
Engineering courses in a secondary field—at least three units at the 500 level.....	9
Electives—these courses must be supportive courses chosen from engineering or the sciences (physical, biological, computer, social or mathematical) .....	9
Mathematical Science—at least three units at the 500 level .....	9
* Engr 599—Design Project (Thesis) .....	9
	**45

\* The student may be permitted a non-thesis option by:

1. obtaining approval of the adviser and the Engineering Graduate Studies Committee,
2. substituting nine units of 500 level coursework which support the chosen fields, and
3. passing a comprehensive examination covering the graduate program.

\*\* At least 24 units must be in courses organized primarily for graduate students (500 level). All course selection must be approved by the student's adviser and the Engineering Graduate Studies Committee.

# AERONAUTICAL ENGINEERING DEPARTMENT

Department Head, John D. Nicolaides

Alfred E. Andreoli  
Thomas W. Carpenter

Frank J. Hendel  
Jon A. Hoffman

Doral R. Sandlin

The Aeronautical Engineering curriculum prepares students for engineering work dealing with aerodynamics, flight testing, structures, propulsion, controls, and ground support equipment for aircraft, missiles, and spacecraft. The problems faced by the aerospace industry offer an unusual engineering challenge. Much of the analysis must be accomplished at the very frontiers of knowledge yet products must nevertheless be designed and manufactured. Thus, an exceptionally wide gamut of engineering abilities is required within the industry and government.

The curriculum of the Aeronautical Engineering Department is accredited by the Engineers' Council for Professional Development. It places emphasis on both analysis and design. Supplementary to both is the basic work in drafting, shops, and laboratory. Throughout the entire four-year curriculum there is constant interplay between theory and application. Opportunities are available for advanced elective work in the student's field of special interest.

Graduates of the Aeronautical Engineering Department obtain employment in all phases of the aerospace industry such as general design, aerodynamics, stress analysis, flight testing, and field engineering.

The department has laboratories for fabrication, propulsion, structural test, and aerodynamics, and also has two design rooms and a hangar with adjoining airstrip.

The department sponsors a student chapter of the national society—the American Institute of Aeronautics and Astronautics.



## CURRICULUM IN AERONAUTICAL ENGINEERING

Freshman	F	W	S
Aerospace Fundamentals (Aero 121, 122, 123) .....	2	2	2
* Manufacturing Processes .....	1		1
Digital Computer Applications (Engr 251) .....			2
Applied Descriptive Geometry (ETME 141) .....	2		
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Physics (Phys 131, 132) .....		4	4
Freshman Composition (Engl 104) .....	3		
Literature elective .....		4	
Life Science elective .....	3		
General Psychology (Psy 202) .....		3	
General Chemistry (Chem 124) .....			4
Physical Education activity .....	1		
	16	17	17

\* ETMP 121 required; the remaining two units may be selected from ETMP 144; IE 141, 142; ETWT 144; IT 141.

Sophomore	F	W	S
Humanities .....			3
Applied Aerodynamics (Aero 201) .....		3	
Aero Laboratory (Aero 203) .....	2		
Strength of Materials (CE 208) .....		3	
Strength of Materials (CE 209) .....			3
Electric Circuit Theory (EE 201) .....			3
Electric Circuits Laboratory (EE 261) .....			1
* Manufacturing Process .....			1
General Physics (Phys 133) .....	4		
Engineering Mechanics (ME 211, 212) .....	3	4	
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Advanced Engineering Mathematics (Math 318) .....			4
General Chemistry (Chem 125) .....	4		
American Government (Pol Sc 201) .....		3	
Physical Education activity .....			1
	17	17	16
Junior			
Aerothermodynamics (Aero 301, 302, 303) .....	4	4	3
Stress Analysis (Aero 324) .....		4	
Aerodynamics (Aero 306) .....			3
Aerothermodynamics Laboratory (Aero 304) .....		2	
Introduction to Numerical Methods (CSc 332) .....	3		
Electronics (EL 321) .....			3
Materials Engineering (Met 306) .....			3
Survey of Economics (Econ 201) .....			3
Report Writing (Engl 218) .....		3	
** Aeronautical Engineering electives .....			3
American Democracy and World Affairs (Hist 206) .....		5	
Literature or Philosophy elective .....	4		
Wind Tunnel and Flight Test Laboratory (Aero 307) .....	2		
Mechanical Vibrations (ME 316) .....	3		
Physical Education activity .....	1		
	17	18	18
Senior			
Stability and Control (Aero 415) .....	3		
Aero Design (Aero 444, 445) .....	4	4	
Senior Project (Aero 461, 462) .....	2	2	
Undergraduate Seminar (Aero 463) .....			2
Gas Dynamics I (Aero 404) .....	4		
Propulsions (Aero 401) .....		4	
Engineering Economy (IE 415) .....			2
** Aeronautical Engineering Science electives .....	2		3
** Aeronautical Engineering electives .....	3	3	
Electives .....		3	6
	18	16	13

See COURSES OF INSTRUCTION section of this catalog for description of courses in Aeronautical Engineering and other subjects.

\* ETMP 121 required; the remaining two units may be selected from ETMP 141, 142, 144; IE 141, 142; ETWT 141, 142, 144; IT 141.

\*\* To be chosen with adviser approval.

## CIVIL ENGINEERING DEPARTMENT

Department Head, Andrew D. Jones

Fathy Akl  
Marshall L. Anderson

Charles P. Davis  
Stuart E. Larsen

Robert E. Sennett

The Civil Engineering degree program is concerned with all types and facets of the transportation and public works problems of the state and nation. The program emphasizes the team design concept and systems approach to problem solving.

Graduates of the program will be trained for the expanding needs of the state and nation in transportation, structural work, and hydraulics under the broad programs of transportation and public works. The emphasis is on preparation for immediate entry into the profession, and students completing the program will find a wide variety of positions available in local, state, and federal government service. These include positions with airport, transit and regional planning agencies and districts as well as with firms involved in the planning, design, and construction of highways, airfields, waterways, and varied structures. In addition, planning and industrial firms and consulting opportunities offer a wide range of career choices.

The curriculum includes surveying, structures, operations research, computer science, and transportation planning—all based upon broad coverage of the engineering sciences and basic sciences, mathematics, social sciences, and humanities. The program is oriented toward the practical problems of the industrial world, but adequate scientific depth is maintained so that graduates will be readily accepted into graduate programs in civil engineering.



### CURRICULAR OPTIONS

#### Public Works

Emphasizes planning, design, construction, operation, and maintenance of major public works systems such as utilities, dams, recreational facilities, etc.

#### Transportation

Emphasizes planning, design, construction, operation, and maintenance of all types of transportation systems including air, water, and land based systems.

### CURRICULUM IN CIVIL ENGINEERING

Freshman	F	W	S
Civil Engineering Fundamentals (CE 121, 122, 123) .....	2	2	2
Applied Descriptive Geometry (ETME 141) .....	2		
Engineering Problems—Digital Computers (Engr 251) .....			2
Engineering Surveying (AE 237) .....			2
* Manufacturing Processes .....	1	1	

\* ETMP 121 required; the remaining unit of MP may be selected from ETMP 144; IE 141; ETWT 144.

	F	W	S
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Chemistry (Chem 124, 125) .....	4	4	
General Physics (Phys 131) .....			4
Freshman Composition (Engl 104, 105 or 218) .....	3	3	
Life Science elective .....		3	
Electives and courses to complete major .....			3
* Physical Education.....	1	1	1
	17	18	18
<b>Sophomore</b>			
Introduction to Traffic Problems and Transportation (CE 221) .....	4		
Civil Engineering Materials (CE 228) .....		3	
Engineering Mechanics (ME 211, 212) .....	3	4	
Strength of Materials (CE 208, 209) .....	3	3	
Engineering Surveying (AE 238) .....	2		
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
General Physics (Phys 132, 133) .....		4	4
Humanities .....			3
Principles of Economics (Econ 211) .....			3
American Government (Pol Sc 201) .....			3
Electives and courses to complete major .....			5
	16	18	18
<b>Junior</b>			
Stress Analysis (CE 322, 323) .....	3	3	
Materials of Engineering (Met 306) .....		3	
Public Works Design (CE 325) .....			3
Civil Engineering Materials (CE 329) .....		3	
Fluid Mechanics (ME 341) .....	3		
Electric Circuit Theory (EE 201) .....			3
Electric Circuits Laboratory (EE 261) .....			1
** Literature elective .....	4		
American Democracy and World Affairs (Hist 206) .....		5	
** Literature or Philosophy .....			3
Thermodynamics (ME 302) .....	3		
Approved technical electives .....			2
Electives and courses to complete major .....	3	3	3
	16	17	15
<b>Senior</b>			
Steel Structures (CE 423) .....			4
Senior Project (CE 461, 462) .....		2	2
Undergraduate Seminar (CE 463) .....			2
Electronics (EL 321) .....	3		
Electronics Laboratory (EL 361) .....	1		
Humanities (Hum 402) .....		3	
*** Approved technical electives .....	4	4	
Electives and courses to complete major .....	8	7	7
	16	16	15

\* Student may select any combination of PE courses, including PE 250, to total 3 units.

\*\* To be selected in accordance with General Education requirements with adviser approval.

\*\*\* Selected with adviser approval from approved list.



## PUBLIC WORKS OPTION

(Add courses below to Basic Curriculum)

### Sophomore

Stat 211	Elementary Probability and Statistics .....	3
Stat 212	Statistical Methods .....	3
AE 239	Engineering Surveying .....	2

### Junior

Met 341	Materials Engineering Lab.....	1
EnvE 325	Environmental Air Quality .....	3
EnvE 330	Environmental Quality Control.....	3
Psy 202	General Psychology .....	3

### Senior

CE 434	Public Transportation.....	3
Geol 201	Geology.....	3
CE 464	Professional Practice .....	3
IE 414	Engineering Economics.....	3



## TRANSPORTATION OPTION

(Add courses below to Basic Curriculum)

### Sophomore

Stat 321	Statistical Analysis .....	3
Stat 322	Statistical Analysis .....	3

### Junior

IE 304	Operations Research.....	3
EnvE 324	Introduction to Air Pollution.....	3
CE 324	Traffic Engineering Operations and Control .....	4
Econ 433	Transportation Economics.....	3

### Senior

CE 433	Transportation Systems Planning .....	4
CE 435	Airport Planning and Design .....	4
Soc 313	Urban Sociology .....	3

See COURSES OF INSTRUCTION section of this catalog for description of courses in Civil Engineering and other subjects.

# ELECTRONIC AND ELECTRICAL ENGINEERING DEPARTMENT

Department Head, Warren R. Anderson

Richard A. Bucich  
Thomas T. L. Chou  
Michael M. Cirovic  
Edward J. Clerkin  
Clifford B. Cloonan  
S. K. Datta  
Richard K. Dickey

Eugene D. Fabricius  
Michael J. Fitzpatrick  
Saul Goldberg  
Harry Hazebrook  
Robert W. Hecht  
William F. Horton  
Robert E. Lee

John W. McCombs  
Wayne E. McMorran  
Shien-Yi Meng  
Jacques Sabto  
James H. W. Tseng  
Donley J. Winger  
Chuan-Sung Yeh

The Electronic and Electrical Engineering Department offers two degree programs, which are accredited by the Engineers' Council for Professional Development: the B.S. Degree in Electronic Engineering and the B.S. Degree in Electrical Engineering. When applying for admission one of the two majors must be selected. These two majors have identical curricula through the sophomore year with minor differences in the junior year. Consequently, the student may elect a major change from one to the other as late as during the junior year.

The main objective of the department is to prepare the student for engineering; i.e., finding the answers to urgent problems in reshaping the environment to meet human needs, taking into account all implications. The curriculum provides a sound theoretical background along with current, immediately useful, practical engineering knowledge. The student begins the major in the first term with orientation and has one or more major courses each term until graduation. The many laboratory courses provide practical instrumentation experience and lead logically into design beginning in mid-third year.



Senior students select specialized interest courses which make them more attractive to industry as early contributors. The student wishing to pursue graduate work directly may select appropriate senior courses in keeping with this goal. In the required senior design project, students demonstrate their understanding of engineering knowledge and their capability to apply that knowledge creatively to practical problems of design with a minimum of supervision. Learning in the humanities and the social sciences extends over all years.

Students are encouraged to participate in the clubs sponsored by the department. These are the Institute of Electrical and Electronic Engineers Student Branch, an international professional society; Eta Kappa Nu, a National Electrical and Electronic scholastic honor society; Poly Phase Club, an active socially-oriented organization; International Society for Hybrid Microelectronics; and the Audio Engineering Society.

## BASIC CURRICULUM

The first two years of the Electronic Engineering and Electrical Engineering curricula introduce the student to material basic to both of these disciplines.

Freshman	F	W	S
Orientation (EE 110) .....	1		
Intro to Electronic Instrumentation (EL 111) .....		1	
Intro to DC Circuit Analysis (EE 112) .....			2
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Chemistry (Chem 124, 125) .....	4	4	
General Physics (Phys 131, 132) .....		4	4
Freshman Composition (Engl 104) .....	3		
Report Writing (Engl 218) .....			3
Life Science elective .....			3
Fortran Programming (CSc 101) .....		2	
Electronic Graphics and Standards (ETME 156) .....	2		
Microbonding (ETWT 152) .....		2	
Electronic Assembly Techniques (ETMP 244) .....			2
Physical Education activity .....	1		
	15	17	18
Sophomore			
Electric Circuits (EE 211, 212) .....	3	3	
Electric Circuits Laboratory (EE 241, 242) .....	1	1	
Introduction to Electric and Magnetic Fields (EL 207) .....	3		
Electronic Devices (EL 208) .....			3
Electronic Devices Laboratory (EL 248) .....			1
Logic and Switching Circuits (EL 219) .....		3	
Numerical Engineering Analysis (CSc 311) .....			3
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Advanced Engineering Mathematics (Math 318) .....			4
Engineering Mechanics (ME 211, 212) .....	3	4	
Materials Engineering (Met 306) .....	3		
American Democracy and World Affairs (Hist 206) .....			5
Physical Education activity .....		1	1
	17	16	17

## CURRICULUM IN ELECTRONIC ENGINEERING

Electronic Engineering is that branch of engineering which deals with the development, design and application of circuits, devices and systems for communication, computers, controls, information processing and display, and system instrumentation. The curriculum includes basic circuit, field and device theory accompanied by logic and switching circuit design. Course updating keeps the curriculum in step with current technical advancements in the electronic field.

Senior elective courses provide specialized preparation in a selected area such as active and passive network synthesis, advanced communications, computer system design, microelectronic circuit engineering, microprocessor systems applications, microwave engineering, and solid state devices.

The department has laboratories equipped to support the program. They provide not only hands-on instrumentation experience, but also design experience.

Junior	F	W	S
Signal Transmission (EL 303) .....			3
Signal Transmission Laboratory (EL 343) .....			1
Digital Integrated Electronics (EL 307) .....	3		
Digital Integrated Electronics Laboratory (EL 347) .....	1		
Electronic Circuits (EL 308) .....		3	
Electronic Circuits Laboratory (EL 348) .....		1	
Integrated Electronic Circuits (EL 309) .....			3
Integrated Electronic Circuits Laboratory (EL 349) .....			1
Digital System Design (EL 319) .....		3	

	F	W	S
Electromagnetic Fields I (EL 334) .....			3
Network and System Analysis (EE 301) .....	3		
Advanced Circuit Laboratory (EE 341) .....	1		
Linear Control Systems (EE 302) .....		3	
Control Systems Laboratory (EE 342) .....		1	
Energy Conversion Electromagnetics (EE 325) .....	3		
Energy Conversion Laboratory (EE 365) .....	1		
Modern Physics (Phys 211) .....	4		
Thermodynamics (ME 302) .....		3	
Heat Transfer (EnVE 313) .....			3
Survey of Economics (Econ 201) .....		3	
American Government (Pol Sc 201) .....			3
	16	17	17
<b>Senior</b>			
Electromagnetic Fields II (EL 401) .....	3		
Signal Processing (EL 414) .....	3		
Senior Project (EL 461, 462) .....	2	2	
Undergraduate Seminar (EL 463) .....	2		
* Approved technical electives .....	4	5	2
Solid State Physics for Engineers (Phys 412) .....	3		
Solid State Physics lab for Engineers (Phys 452) .....		1	
Human Values (Hum 402), Science, Technology, and Public Policy (Pol Sc 404) or The New Deal and Contemporary America (Hist 407) .....		3	
† Humanities elective .....			3
† Literature or Philosophy .....		4	3
Psychology .....		3	
Electives .....			9
	17	18	17

### CURRICULUM IN ELECTRICAL ENGINEERING

Electrical Engineering is that branch of engineering which deals with industrial process control systems and with generation, distribution, control and utilization of electric power. The curriculum includes basic circuit, field and device theory accompanied by control systems and power system analysis. Course updating keeps the curriculum in step with current technical advancements in the electrical field.

Senior elective courses provide specialized preparation in a selected area such as advanced control systems, energy conversion, power system analysis, protection and stability and solid state motor control.

The Electric Power Institute, sponsored by the department and underwritten by major utility companies and electrical equipment manufacturers, offers advanced seminars and lectures in the power field and provides limited student and faculty exchange opportunities.

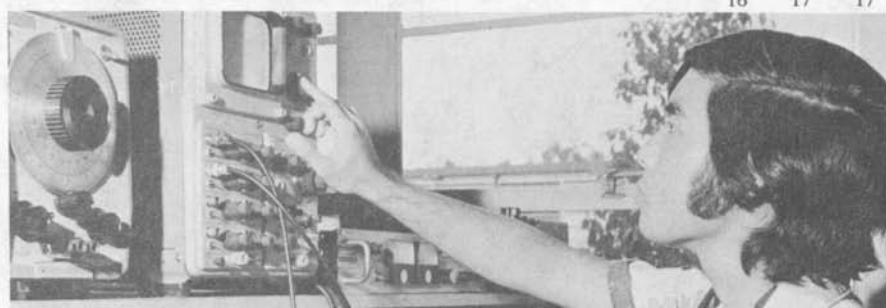
The department has laboratories equipped to support the program. They provide not only hands-on instrumentation experience, but also design experience.

	F	W	S
<b>Junior</b>			
Network and System Analysis (EE 301) .....	3		
Advanced Circuit Laboratory (EE 341) .....	1		
Linear Control Systems (EE 302) .....		3	
Control Systems Laboratory (EE 342) .....		1	
Power Transmission (EE 303) .....			3
Power Transmission Laboratory (EE 343) .....			1

\* A minimum of 2 senior design laboratories with EL or EE prefixes and two design lecture courses in the major are required.

† To be selected in accordance with General Education requirements.

	F	W	S
Energy Conversion Electromagnetics (EE 325) .....	3		
Energy Conversion Laboratory (EE 365) .....	1		
Digital Integrated Electronics (EL 307) .....	3		
Digital Integrated Electronics Laboratory (EL 347) .....	1		
Electronic Circuits (EL 308) .....		3	
Electronic Circuits Laboratory (EL 348) .....		1	
Integrated Electronic Circuits (EL 309) .....			3
Integrated Electronics Circuits Laboratory (EL 349) .....			1
Digital System Design (EL 319) .....		3	
Electromagnetic Fields I (EL 334) .....			3
Introduction to Modern Physics (Phys 210) .....	4		
Thermodynamics (ME 302) .....		3	
Heat Transfer (EnvE 313) .....			3
Survey of Economics (Econ 201) .....		3	
American Government (Pol Sc 201) .....			3
	<u>16</u>	<u>17</u>	<u>17</u>



Senior	F	W	S
Power System Analysis I (EE 406) .....	4		
Senior Project (EE 461, 462) .....	2	2	
Undergraduate Seminar (EE 463) .....	2		
Signal Processing (EL 414) .....	3		
Fluid Mechanics (ME 341) .....	3		
* Approved technical electives .....	4	6	1
Human Values (Hum 402), Science, Technology and Public Policy (Pol Sc 404) or The New Deal and Contemporary America (Hist 407) .....		3	
† Humanities elective .....			3
† Literature or Philosophy .....		4	3
Psychology .....		3	
Electives .....			9
	<u>18</u>	<u>18</u>	<u>16</u>

See COURSES OF INSTRUCTION section of this catalog for description of courses in Electrical Engineering, Electronic Engineering, and other subjects.

\* A minimum of two senior design laboratories with EL or EE prefixes and two design lecture courses in the major is required.

† To be selected in accordance with General Education requirements.

# ENGINEERING SCIENCE

(Interdisciplinary Program)

Coordinator, Richard K. Dickey

The curriculum in Engineering Science is designed for those students seeking comprehensive education in the fundamental principles and concepts of engineering as distinguished from specialization in one engineering discipline. It is a broad, flexible program in engineering which provides ample opportunity for each student (with aid from an adviser) to plan a program to meet personal career objectives. For example, a student can create excellent programs in engineering physics, bio-engineering, pre-medicine, etc.



The engineering sciences are based on an extensive study of mathematics, physics, and chemistry. They are (1) mechanics of solids and fluids, (2) electrical science including electric and magnetic fields, circuits, and electronics, (3) thermodynamics and statistical mechanics, (4) materials science, (5) information theory, (6) logic and computing devices, (7) systems analysis, and (8) transfer and rate processes, including heat and mass transfer.

The curriculum provides ample elective time for the selection of courses appropriate to the student's career objectives. Of the total 42 elective units, 21 are required to be chosen from a list of design systems and synthesis courses. In order to create a meaningful sequence of courses, the student will probably have to defer some of the technical courses (shown in the display below) to the senior year and start more electives in the junior year.

At the beginning of the junior year, and no later than the end of the first quarter, the student will be required to submit to the Coordinator a "study plan" of electives. They must form a meaningful sequence of courses combining a consistent engineering and/or science flavor.

## CURRICULUM IN ENGINEERING SCIENCE

Freshman	F	W	S
Introduction to DC Circuit Analysis (EE 112) .....			2
Digital Computer Applications (Engr 251) .....			2
* Manufacturing Process .....	2		2
Applied Descriptive Geometry (ETME 141) .....			2
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4

\* To be selected from ETMP 144, 145; ETWT 144; Engr 302.

	F	W	S
General Chemistry (Chem 124, 125) .....	4	4	
General Physics (Phys 131, 132) .....		4	4
Freshman Composition (Engl 104, 218 or 105) .....	3	3	
Literature or Philosophy .....			3
** Life Science .....	3		
Physical Education activity .....		1	
	16	16	19
<b>Sophomore</b>			
Engineering Mechanics (ME 211, 212) .....	3	4	
Strength of Materials (CE 207) .....			5
Strength of Materials Laboratory (CE 229) .....			1
Electric Circuit Analysis (EE 211, 212) .....	3	3	
Electric Circuits Laboratory (EE 241, 242) .....	1	1	
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Advanced Engineering Mathematics (Math 318) .....			4
General Physics (Phys 133) .....	4		
Modern Physics (Phys 211) .....		4	
General Psychology (Psy 202) .....			3
Physical Education activity .....	1		1
Electives .....			3
	16	16	17
<b>Junior</b>			
Network and Systems Analysis (EE 301) .....		3	
Advanced Circuits Laboratory (EE 341) .....		1	
Electronics Devices (EL 208) .....			3
Electronics Devices Laboratory (EL 248) .....			1
Theory of Materials (Met 301, 302) .....	4	4	
** Humanities elective .....			3
American Government (Pol Sc 201) .....	3		
Principles of Economics (Econ 201 or 211) .....		3	
Partial Differential Equations (Math 319) .....	3		
Introduction to Numerical Analysis (CSc 332) .....			3
Thermodynamics (ME 302, 303) .....	3	3	
Heat Transfer (EnvE 313) .....		3	
Fluid Mechanics (ME 341) .....	3		
American Democracy and World Affairs (Hist 206) .....			5
	16	17	15
<b>Senior</b>			
Senior Project (Engr 461, 462) .....	2	2	
Undergraduate Seminar (Engr 463) .....			2
Human Values (Hum 402) .....	3		
Literature .....		4	
† Electives .....	12	11	16
	17	17	18

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Engineering and other subjects.

\*\* To be selected in accordance with the General Education requirements.

† Twenty-one of the elective units must be chosen with the approval of the adviser.

# ENGINEERING TECHNOLOGY DEPARTMENT

Department Head, Willis Arnold Finchum

Franklin P. Abshire  
Ray R. Allen  
William R. Backer  
Ian C. Begg  
James R. Ehrenberg  
Fred S. Friedman

Theodore G. Graves  
Michael Hawes  
Earl R. Hesch  
Robert K. Janeway  
Thomas D. Kay  
Irvin J. Kogan

Richard T. Kombrink  
William A. Oliver  
William J. Phaklides  
Robert L. Rogers  
Steven O. Stocker  
Alvin D. Varney

The Engineers' Council for Professional Development defines engineering technology: "Engineering technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer."

The engineering technologist is somewhat less specialized than the engineer, focusing on a wider range of subject matter and skills. In general, the Bachelor of Science in Engineering Technology has less depth in basic and engineering sciences but more specific capability and training in skills and in the areas of production, applied design, equipment modification, service and repair. The Engineering Technology baccalaureate graduate has more depth in both theory and skills than the associate degree technician. In fact, the program is structured to maximize transfer credit from associate technology programs offered by the California Community College System. Considerably more than half of the students in the program are transfer students from these institutions. Field trips to industrial organizations and operations are an on-going part of the Engineering Technology program.

The curriculum in engineering technology is composed of a core of courses taken by all students plus the options shown below. Each student must select one or more of the options for an area of specialization. All options of the curriculum are accredited by the Engineers' Council for Professional Development.

The Bachelor of Science in Engineering Technology training leads to careers in production, quality assurance, field service, maintenance, testing and marketing.

## CURRICULAR OPTIONS

### Air Conditioning-Refrigeration Technology

Emphasizes heating, ventilating, air distribution controls, building sanitation, air conditioning and refrigeration systems; specifically, the areas of modern commercial, industrial and manufacturing system applications.

### Electronic Technology

Emphasizes the practical and applied aspects of the electronic field with study in analog circuits, communication systems, control systems, digital computers, and instrumentation.

### Manufacturing Processes Technology

Emphasizes design and construction of production tooling, and the study of traditional and nontraditional methods of manufacturing processes, including numerical control.

### Mechanical Technology

Emphasizes applied machine design, mechanical equipment and systems, including fluid power, process control and instrumentation, production planning and supervision, plant equipment repair and maintenance.

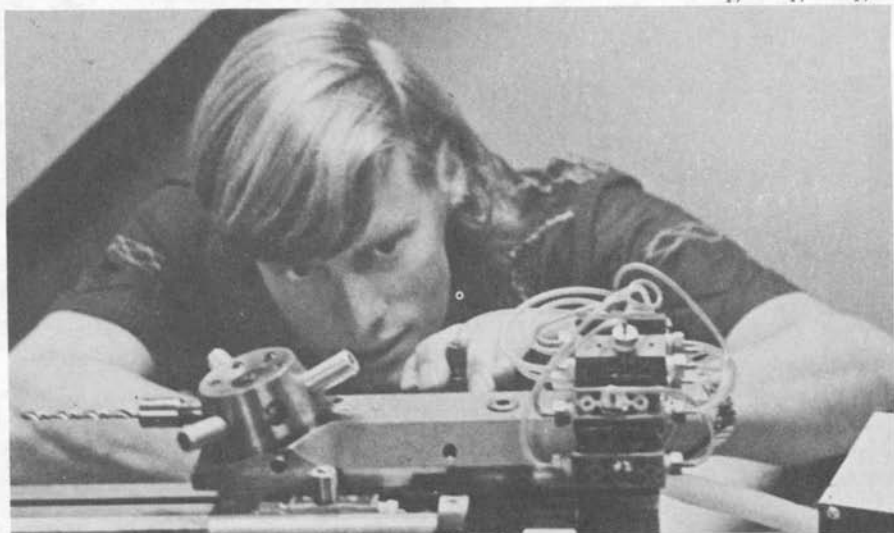
### Welding Technology

Emphasizes all aspects of the welding field including techniques, nondestructive testing, power sources, and production problems.



# CURRICULUM IN ENGINEERING TECHNOLOGY

Freshman	F	W	S
Introduction to DC Circuits (ETEL 124) .....	4		
Introduction to AC Circuits (ETEL 125) .....		4	
Electrical Practices (ETEL 126) .....			4
** Manufacturing Processes .....	2		2
** Applied Descriptive Geometry (ETME 141 or ETME 156) .....	2		
** Engineering Drawing Systems (ETME 142 or ETAC 122) .....			2
College Algebra and Trigonometry (Math 120) .....	5		
Technical Calculus (Math 131, 132) .....		4	4
College Physics (Phys 121, 122) .....		4	4
Freshman Composition (Engl 104) .....	3		
Physical Education activity .....		1	1
Electives and courses to complete major .....	1	4	
	17	17	17



Sophomore	F	W	S
** Manufacturing Processes .....	1		
Production Costs Estimating (IE 201) .....		3	
Digital Computer Applications (Engr 251) .....		2	
Statics (ETME 205) .....	3		
Dynamics (ETME 206) .....		4	
Report Writing (Engl 218) .....			3
Technical Calculus (Math 133) .....	4		
College Physics (Phys 123) .....	4		
General Chemistry (Chem 121) .....		4	
Metallurgy for Engineering Technology (Met 235) .....			4
Principles of Speech (Sp 200) .....			3
Physical Education activity .....	1		
Electives and courses to complete major .....	4	4	6
	17	17	16

\*\* To be selected with approval of adviser.

Junior	F	W	S
Thermodynamics (ETME 301) .....	4		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
# Humanities (not History) .....			3
American Government (Pol Sc 201) .....	3		
# Social Science .....		3	3
** Approved technical electives .....	4	4	4
Electives and courses to complete major .....	4	6	3
	15	16	16
Senior			
Senior Project (ET 461, 462) .....	2	2	
Undergraduate Seminar (ET 463) .....			2
# Literature .....	3		
# Literature or Philosophy .....			3
# Life Science .....			3
Humanities or Social Science .....		3	
** Approved technical electives .....	3	3	4
Electives and courses to complete major .....	7	6	3
	15	14	15

## AIR CONDITIONING-REFRIGERATION TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
ETAC 121 Air Conditioning and Refrigeration Principles ..... (4)	EnvE 301 Introduction to Heat Transfer ..... (3)
ETAC 123 Environmental Graphics .. (2)	ETAC 321 Air Distribution Systems.. (3)
	ETAC 331 Refrigeration Systems..... (3)
Sophomore	Senior
EnvE 202 Heating and Ventilating .... (3)	ETAC 332 Refrigeration Systems..... (3)
ETAC 221 Mechanical Equipment of Buildings ..... (3)	ETAC 425-6 Air Conditioning Systems ..... (6)
ETAC 201 Air Conditioning and Refrigeration Codes..... (2)	ETAC 439 Instruments and Controls (3)
ETAC 214 Plumbing and Building Sanitation ..... (4)	

## ELECTRONIC TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
ETEL 218 Digital Circuits I ..... (3)	ETEL 311 Advanced Networks ..... (4)
	ETEL 312 Active Linear Circuits ..... (4)
	ETEL 334 Digital Circuits II ..... (4)
Sophomore	Senior
ETEL 232-3 Electronic Circuits and Devices..... (8)	ETEL 335 Communications I ..... (4)
ETEL 234 Passive Network Analysis (4)	ETEL 435 Communications II ..... (4)
	ETEL 438 Minicomputer Technology (4)

# To be selected in accordance with General Education requirements.

\*\* To be selected with approval of adviser.

## MANUFACTURING PROCESSES TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
MfgE 233 Computer Aided Manufacturing..... (2)	ETMP 325 Abrasive Machining and Finishing..... (2)
Sophomore	ETMP 321-2-3 Tool Design ..... (9)
ETMP 224 Advanced Machining Technology..... (4)	IE 214 Production Control..... (2)
ETMP 245 Advanced Machining Operations ..... (2)	Senior
ETWT 235 Nondestructive Examination ..... (4)	ETMP 434-5-6 Tool and Manufacturing Engineering..... (9)
ETME 344 Advanced Design Drawing..... (2)	ETMP 421 Industrial Numerical Control ..... (3)

## MECHANICAL TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	
ME 136 Thermal Systems ..... (2)	ETME 338 Industrial Engines ..... (3)
ME 146 Thermal Syst. Lab..... (1)	ETME 344 Advanced Design Drawing..... (2)
Sophomore	**Approved technical elective ..... (1)
ETME 237 Industrial Hydraulics and Pneumatics ..... (4)	Senior
ETAC 221 Mechanical Equipment of Building..... (3)	ETME 421 Applied Machine Design (4)
Junior	ETME 422 Applied Machine Design (4)
ETME 320 Mechanisms ..... (4)	ETME 437 Applied Fluid Power Systems ..... (4)
ETME 337 Instrumentation of Mechanical Systems ..... (3)	ETME 443 Mechanical Systems ..... (4)

## WELDING TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Sophomore	Junior
ETWT 235 Nondestructive Examination ..... (4)	ETWT 259 Advanced Welding..... (1)
MET 222 Physical Metallurgy ..... (4)	ETWT 324-5-6 Welding Technology (12)
MET 223 Nonferrous Alloys..... (2)	Senior
Chem 122 General Chemistry ..... (4)	ETWT 336 Welding Power Sources .. (3)
	ETWT 434-5-6 Advanced Welding Technology..... (9)

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Engineering Technology.

\*\* To be selected with approval of adviser.

# ENVIRONMENTAL ENGINEERING DEPARTMENT

Department Head, Walter E. Holtz

William E. Clark  
Harold M. Cota

Rodney G. Keif  
Dragoslav M. Mistic

Philip W. B. Niles

Environmental Engineering is concerned with the interrelation of man, materials, and processes in a complex and changing environment. The broad field of environmental engineering includes control of air and water pollution, industrial hygiene, reduction of noise and vibration, air conditioning, heating, ventilation, and refrigeration. It also includes conservation of energy and the utilization of new energy sources such as solar energy.

The program offers a sound background in the fundamentals of thermodynamics, heat transfer, fluid mechanics, mass transfer, and physico-chemical characteristics of living and inanimate matter. The student will specialize in one of the curricular concentrations described below. The problem-oriented approach to instruction, in modern well-equipped laboratories, shops and design rooms, provides the student an excellent opportunity to gain understanding and experience as a joint exploration with the faculty. The curriculum is accredited by the Engineers' Council for Professional Development.

The Environmental Sciences and Engineering Club and a student branch of the American Society of Heating, Refrigeration, and Air Conditioning Engineers offer vigorous programs of technical and other activities, including field trips each year to the Los Angeles and San Francisco areas to study typical installations of systems. Student memberships also are available in the Air Pollution Control Association, the California Water Pollution Control Association, and the Water Pollution Control Federation.

Graduates obtain employment primarily with consulting engineers, manufacturers, contractors, and governmental agencies.

## CURRICULAR CONCENTRATIONS

### Air Conditioning-Refrigeration

This concentration prepares students to enter those phases of engineering dealing particularly with thermal systems and their control in a variety of applications. These applications include: heating, ventilating, and air conditioning of buildings; energy conservation, insulation, and solar energy utilization; refrigerated food processing and storage; industrial refrigeration; and environmental control in motor vehicles, railroad equipment, and aircraft.

### Air Pollution Control

This concentration prepares students for entry into the field of air pollution control. An engineering approach to the subject enables the students to pursue careers in industry, consulting firms, and public agencies concerned with solving problems of air pollution.

### Solar Environmental Systems

This concentration provides students an opportunity to study the utilization of solar energy which involves the control of the thermal environment of building interiors and various industrial processes.

### Water Pollution-Waste Management

This concentration prepares students for entry into the field of water pollution and waste management. An engineering approach to the subject enables students to pursue careers in industry, with consulting firms, and with public agencies concerned with solving problems in this field.

## CURRICULUM IN ENVIRONMENTAL ENGINEERING

Freshman	F	W	S
Engineering Drawing Systems (ETME 142) .....	2		
* Life Science elective .....		3	
Environmental Engineering Systems (EnvE 101) .....	2		
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Physics (Phys 131, 132) .....		4	4
Freshman Composition (Engl 104, 105) .....	3		3
General Chemistry (Chem 124, 125) .....	4	4	

\* To be selected in accordance with the General Education requirements.

	F	W	S
General Psychology (Psy 202) .....		3	
** Survey of Organic Chemistry (Chem 226) .....			4
Physical Education activity .....			1
	15	18	16
<b>Sophomore</b>			
Environmental Engineering Measurements (EnvE 251) .....			2
Heating and Ventilating (EnvE 202, 203) .....	3	2	
Fluid Systems (EnvE 231) .....	2		
Digital Computer Applications (Engr 251) .....	2		
Engineering Mechanics (ME 211, 212) .....		3	4
Thermodynamics (ME 302) .....			3
# Manufacturing Processes .....		2	2
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
General Physics (Phys 133) .....	4		
Statistical Analysis (Stat 321, 322) .....		3	3
American Government (Pol Sc 201) .....	3		
Humanities elective .....		3	
Survey of Economics (Econ 201) .....			3
Physical Education activity .....		1	
	18	18	17
<b>Junior</b>			
Noise and Vibration Control (EnvE 309) .....	3		
Heat Transfer (EnvE 313) .....	3		
Environmental Air Quality (EnvE 325) .....	3		
Automatic Process Control (EnvE 316) .....			2
Strength of Materials (CE 208) .....	3		
Fluid Mechanics (ME 341) .....		3	
Electric Circuit Theory (EE 201) .....	3		
Electric Circuit Laboratory (EE 261) .....	1		
Electronics (EL 321) .....		3	
Materials Engineering (Met 306) .....		3	
Literature or Philosophy elective .....			3
Physical Education activity .....			1
§ Electives and courses to complete major .....		7	11
	16	16	17
<b>Senior</b>			
Advanced System Design (EnvE 441, 442) .....	3	3	
Advanced Mass and Energy Transfer (EnvE 403) .....	3		
Senior Project (EnvE 461, 462) .....	2	2	
Undergraduate Seminar (EnvE 463) .....			2
* Literature Elective .....		4	
American Democracy and World Affairs (Hist 206) .....			5
Engineering Economy (IE 414) .....	3		
Human Values (Hum 402), or Business Law Survey (Bus 201) .....			3
§ Electives and courses to complete major .....	6	7	7
	17	16	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Environmental Engineering and other subjects.

\*\* Students concentrating in AC & R may substitute Chem 126 or Phys 211.

# To be selected from ETMP 121, 144, 145; ETWT 144, 155; IE 141; Engr 302.

§ 29 of the elective units must be chosen with the approval of the adviser according to the field of concentration.

\* To be selected in accordance with the General Education requirements.

# INDUSTRIAL ENGINEERING DEPARTMENT

Department Head (Acting), James R. Golden

J. Kent Butler  
Millard J. Fotter  
H. JoAnne Freeman

George E. Hoffman  
Unny Menon  
Donald E. Morgan

Paul E. Scheffer  
E. W. C. Wilkins

Industrial Engineering is the profession concerned with solving engineering and management problems by applying scientific logic and by utilizing energy, materials, facilities, and personnel most effectively. Its objective is to improve quality and efficient production of goods and services for humankind and to act as the interface between technology and the human factor. Engineering methods and practical knowledge are used in formulating decision models for optimum application of management principles.

Industrial engineering graduates can choose from a most challenging range of career activities: operations research and analysis, production planning and scheduling, plant design, management, human factors engineering design, data processing and analysis, measurement, quality control and reliability assurance, technical economic planning, resource conservation, productivity measurement, and, in general, systems analysis and design. The physical, engineering, and social sciences form the broad base for these endeavors.

The curriculum leading to the Industrial Engineering Bachelor of Science degree, accredited by the Engineers' Council for Professional Development, is oriented to provide graduates with the capability of producing results with a minimum of additional training. Graduates also are well prepared for successful postgraduate study. Health care industries, banks, retail chains, farms, airlines, mines, computer firms, as well as government and traditional manufacturing industries, employ graduates of this discipline. Active within the department are student chapters of the American Institute of Industrial Engineers and Alpha Pi Mu, the national honorary society for industrial engineers.

Department and University laboratories and equipment, including computers and programmable calculators, are integrated into coursework from matriculation until graduation to investigate, test, and apply theoretical principles learned in the classroom.

## CURRICULAR CONCENTRATIONS

### Manufacturing

A selection of courses stressing the synthesis and improvement of the production process utilizing statistics, economics, operations research, social sciences, human factors, principles of management, and manufacturing methods.

### Systems

A selection of courses stressing the analysis and synthesis of systems. Mathematical and statistical models for management planning and control including the concepts of human factors, information theory, and data feedback as applied to productive systems.

## CURRICULUM IN INDUSTRIAL ENGINEERING

Freshman	F	W	S
Introduction to Industrial Engineering (IE 101) .....	3		
Industrial Systems Analysis (IE 123) .....		4	
Manufacturing Processes (IE 141) .....	1		
* Manufacturing Processes .....		1	2
Engineering Drawing Systems (ETME 142) .....	2		
Digital Computer Applications (Engr 251) .....			2
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Chemistry (Chem 124, 125) .....		4	4
Freshman Composition (Engl 104) .....	3		
Report Writing (Engl 218) .....			3
§ Psychology elective .....		3	

\* ETMP 144; ETWT 144; Engr 302.

§ To be selected in accordance with the General Education requirements.

	F	W	S
§ Life Science elective .....	3		
Physical Education activity .....		1	1
	16	17	16
<b>Sophomore</b>			
Manufacturing Engineering Laboratory (IE 251) .....	4		
Man-Machine Systems (IE 223) .....		4	
Industrial Costs and Controls (IE 239) .....			4
Computer Aided Manufacturing (Mfg E 233) .....	2		
Engineering Mechanics (ME 211) .....			3
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Statistical Analysis (Stat 321) .....			3
General Physics (Phys 131, 132, 133) .....	4	4	4
American Government (Pol Sc 201) .....	3		
American Democracy and World Affairs (Hist 206) .....		5	
§ Humanities elective .....			3
	17	17	17
<b>Junior</b>			
Operations Research (IE 304, 405) .....	3	3	
Manufacturing Design (IE 343) .....			4
Human Factors Engineering (IE 319) .....	3		
Statistical Quality Control (IE 430) .....		3	
Engineering Economy (IE 414) .....			3
# Technical electives .....		3	
Strength of Materials (CE 208) .....	3		
Engineering Mechanics (ME 212) .....		4	
Electric Circuit Theory (EE 201) .....			3
Electric Circuit Laboratory (EE 261) .....			1
Advanced Math elective .....		3	
Statistical Analysis (Stat 322) .....	3		
Principles of Economics (Econ 211) .....			3
§ Literature elective .....	3		
§ Literature/Philosophy elective .....			3
Physical Education activity .....	1		
	16	16	17
<b>Senior</b>			
Fundamentals of Supervision (IE 441, 442) .....	2	1	
Senior Project (IE 461, 462) .....	2	2	
Undergraduate Seminar (IE 463) .....			2
Thermodynamics (ME 302) .....		3	
Fluid Mechanics (ME 341) .....			3
Electronics (EI 321) .....	3		
Electronics Laboratory (EI 361) .....	1		
Principles of Economics (Econ 212) .....	3		
§ Humanities elective .....		3	
# Technical electives .....	6	6	4
Electives .....		2	8
	17	17	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Industrial Engineering, Manufacturing Engineering and other subjects.

§ To be selected in accordance with the General Education requirements.

# A specific set of courses determined by concentration.

## INDUSTRIAL TECHNOLOGY DEPARTMENT

Department Head (Acting), Laurence F. Talbott

Fred Abitia  
William L. Bruckart  
Jack D. Frost  
Roger L. Keep

Kenneth R. Kimball  
Lynn S. Mosher  
Anthony J. Randazzo

Nelson L. Smith, III  
J. Edward Strasser  
Raymond A. Wysock

The Industrial Technology Department offers two curricula which prepare graduates for employment in a broad range of professional positions in industrial management, industrial production, industrial marketing or industrial and public education. For those interested in employment in industry the course offerings qualify students for occupations in the mid-ground between engineering and business. For those planning to teach the technical subjects of industry there are both broad and specific offerings concerning course content and methods in all the major areas. A program leading to the Master of Arts degree is offered for qualified graduates interested in industrial education, whether in the public schools or in industry.



Emphasis is placed upon the study of tools, machines, materials, processes and products. Special consideration is given to the industrial application of mathematics, physics and chemistry. Also of major importance is the development of the ability to work with people concerning matters of a technical nature.

Each student gains a substantial general education through courses in the areas of language communication, social sciences, mathematics, physical education and the arts. Ability to communicate in technical areas is further developed through courses in technical writing and technical drawing.

The Industrial Technology Department's curricula provide for instruction and laboratory experiences in drafting, wood technology, industrial plastics, electricity, electronics, metal technology, power technology, automotives, and graphic arts.



## CURRICULUM IN INDUSTRIAL TECHNOLOGY

This Bachelor of Science degree program emphasizes preparation for technical leadership responsibilities with a broad variety of industries including manufacturing, communication, transportation and utility services. Graduates in the field of industrial technology function in the mid-ground between the applied aspects of engineering and administration. Students who enjoy working primarily with people in solving technical problems are particularly well suited for careers in industrial technology. Preparation for professional specialization in industrial sales, production management, plant facilities, or quality management is provided through the selection of appropriate electives.

Freshman	F	W	S
Technical Computation (IT 101).....	2		
Industrial Technology Careers (IT 112) .....	1		
Fundamentals of Technical Drawing (ETME 142) .....			2
* Manufacturing Processes .....		2	2
College Algebra and Trigonometry (Math 120) .....	5		
Technical Calculus (Math 131) .....		4	
Freshman Composition (Engl 104, 105) .....	3	3	
College Physics (Phys 121, 122) .....		4	4
Life Science elective .....			3
Physical Education activity .....	1	1	
Electives .....	4	2	5
	16	16	16
Sophomore			
Marketing Principles (Mktg 204 or Mktg 301) .....			4
Industrial Electricity (IT 237, 238) .....	3	3	
** Elementary Probability and Statistics (Stat 211) .....		3	
** Statistical Methods (Stat 212) .....			3
Principles of Economics (Econ 211, 212) .....	3	3	
Principles of Accounting (Actg 221, 222) .....		4	4
General Chemistry (Chem 121, 122) .....	4	4	
Chemistry or Physics (Chem 226 or Phys 123) .....			4
Physical Education activity .....	1		
Electives .....	5		1
	16	17	16
Junior			
Quality Systems Applications (IT 350) .....			3
Industrial Electrical Systems (IT 331) .....	4		
Electronic Control Systems (IT 332) .....		4	
Electronic Computer Applications (IT 333) .....			3
Product Evaluation (IT 326) .....			2
Power Technology (IT 222) .....		4	
Technical Sketching (IT 245) .....		2	
Plant Safety Fundamentals (IT 311) .....			3
Industrial Marketing (IT 405) .....		2	
Industrial Management (Mgt 311) .....	3		
Humanities elective .....	3		
General Psychology (Psy 202) .....	3		
Literature elective .....			4
Literature or Philosophy elective .....		3	
† Electives .....	2	1	1
	15	16	16

\* Chosen from IT 141 or Engr 302; ETMP 144; IE141; ETWT 144.

\*\* Consult with adviser. Stat 321–322 should be substituted for Stat 211–212 as prerequisites depending on the adviser-approved electives.

† 15 units of the above must be chosen with approval of the adviser.

Senior	F	W	S
Cost Reduction and Control (IT 406) .....	3		
Industrial Equipment Selection (IT 415) .....			3
Mechanical Systems (IT 431, 432, 433) .....	3	3	3
Technical Management Problems (IT 418) .....		4	
Industrial Technology Seminar (IT 460) .....	2		
Senior Project (IT 461, 462) .....		2	2
American Government (Pol Sc 201) .....	3		
American Democracy and World Affairs (Hist 206) .....			5
+ Electives .....	5	7	3
	16	16	16

## CURRICULUM IN INDUSTRIAL ARTS

This major provides for the undergraduate professional preparation of future industrial education teachers at the secondary and junior college levels. Students select one concentration from the six listed below. In addition to specialization in one field, the student receives a broad basic training in most of these specialties. Graduates of this major have an extensive understanding of industrial manufacturing procedures plus the ability to work well with students in helping them to become familiar with processes of industry. The program leads to a Bachelor of Arts degree. The Single Subjects Credential (for secondary teaching) is available upon successful completion of this program. Those preferring not to go into teaching may substitute technical laboratory electives for the student teaching requirement.

## CURRICULAR CONCENTRATIONS

### Automotives

Emphasizes the industrial education teaching aspects of power mechanics and automotive technology including engines, fuel system, chassis, electronics and power trains.

### Drafting

Prepares students to teach drafting in the public schools.

### Electronics

Prepares for the teaching of industrial education electronics with emphasis upon electronic principles, component, functions, construction testing, trouble shooting and repair of equipment plus planning, equipping and organizing for the teaching of electronic programs.

### Graphic Arts

This concentration prepares the student to teach industrial arts graphic arts in the public schools. Specialized courses in this industrial area are offered by the Graphic Communications Department and by the Art Department.

### Metals

Emphasis is upon a broad general metals knowledge with skill in the areas of bench metal, layout, foundry, machining, welding and related art metal as well as metal production processes suitable for secondary school instruction.

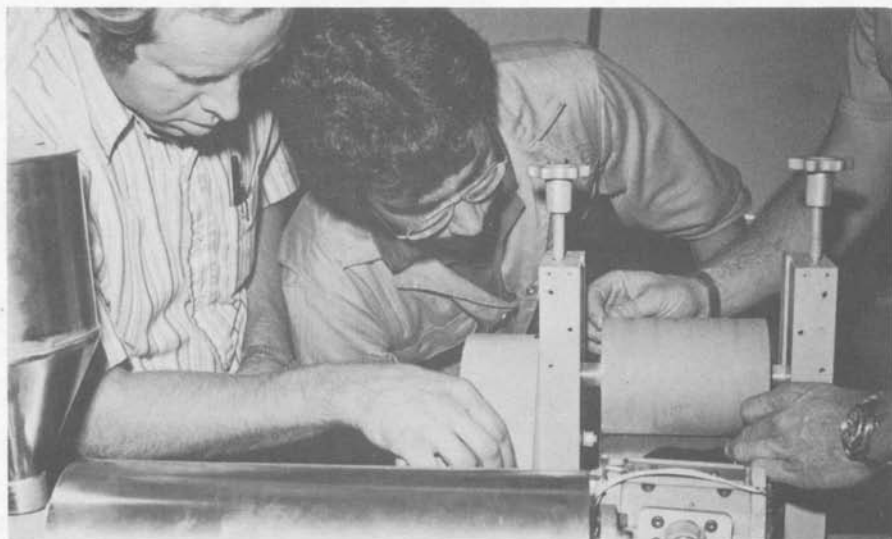
### Wood-Plastics

Basic materials and processes. School wood laboratory equipment, maintenance, production processes, mill cabinet work and building construction. Processing, mold construction, process control, and test methods for plastics.

Freshman	F	W	S
Technical Computation (IT 101) .....	2		
Industrial Education Careers (IT 111) .....	1		

+ 15 units of the above must be chosen with approval of the adviser.

	F	W	S
Fundamentals of Technical Drawing (ETME 142) .....	2		
Metal Technology (IT 233) .....	3		
# Manufacturing Processes .....	1		2
Industrial Wood Processes (IT 125) .....		3	
Mathematics (Math 114 or 115) .....		3	
Freshman Composition (Engl 104, 105) .....	3	3	
College Physics or Chemistry (Phys 121, 122 or Chem 121, 122) .....		4	4
Life science elective .....			3
Physical Education activity .....			1
** Electives and courses to complete major .....	3	2	6
	15	15	16



Sophomore	F	W	S
Automotive Power (IT 250) .....			4
Technical Sketching (IT 245) .....		2	
General Psychology (Psy 202) .....	3		
American Government (Pol Sc 201) .....		3	
Industrial Electricity (IT 237, 238) .....	3	3	
Wood Technology (IT 353) .....			3
Advanced Composition (Engl 300) .....		3	
Principles of Speech (Sp 200) .....	3		
Elementary Probability and Statistics (Stat 211) .....		3	
Humanities elective .....	3		
Survey of Economics (Econ 201) .....	3		
Introduction to Literature (Engl 207) .....			3
Physical Education activity .....		1	1
** Electives and courses to complete major .....	—	1	5
	15	16	16

# ETMP 144; ETWT 144.

\*\* 23 of the elective units must be chosen with the approval of the adviser in a field of concentration.

Junior	F	W	S
Technical Drawing (IT 444) .....			4
Curriculum and Methods of Industrial Education (IT 424) .....			3
Plastics Technology (IT 327) .....		2	
Industrial Design (IT 346) .....			2
Learning Process (Ed 335) .....		3	
Physical Science (Phys 123 or Chem 226) .....	4		
Multicultural Education (Ed 301) .....	3		
Diagnosis, Prescription and Evaluation (Ed 436) .....			2
Literature or Philosophy elective .....		4	
Instructional Processes (Ed 438) .....		3	
** Electives and courses to complete major .....	8	4	4
	15	16	15
Senior			
Mechanical Systems (IT 433) .....	3		
Approved 300-400 IT courses .....	7	3	
Industrial Education Seminar (IT 459) .....	2		
Senior Project (IT 461, 462) .....		2	2
Plant Safety Fundamentals (IT 311) .....	3		
Preliminary Student Teaching (Ed 430) or elective courses .....		6	
Student Teaching (Ed 440) or elective courses .....			12
American Democracy and World Affairs (Hist 206) .....		5	
** Electives and courses to complete major .....	1		1
	16	16	15

### MASTER OF ARTS IN INDUSTRIAL ARTS

The Master of Arts in Industrial Arts program provides preparation for professional responsibilities including leadership in industrial education. It is designed to be of practical value to secondary school and community college instructors in industrial arts and trade-technical subjects. It will also aid those preparing for administrative-type positions in these areas. The program also meets the requirements for the permanent California Secondary Single-Subject Teaching Credential. The master's degree in a subject field such as Industrial Arts is required for regular credentialing to teach at the community college level.

The curriculum includes opportunities for obtaining knowledge and skills at advanced levels in technical areas and covers aspects common to current industrial education in curriculum, facilities, trends, organization, administration and research.

\*\* 23 of the elective units must be chosen with the approval of the adviser in a field of concentration.

## CURRICULUM FOR THE MASTER OF ARTS DEGREE

For University requirements see *Graduate Studies Announcement*

Required:	<i>Units</i>
IT 515 History and Philosophy of Industrial Education .....	3
IT 520 Organization and Administration of Industrial Education .....	3
IT 521 Curriculum in Industrial Education .....	3
IT 522 Facility Planning in Industrial Education .....	2
IT 527 Trends and Issues in Industrial Education .....	3
IT 580 Graduate Seminar in Industrial Education .....	3
*IT 599 Industrial Education Thesis or Project.....	5 22
Courses in professional education at the 500 level chosen with approval of the adviser .....	9
Elective courses at the 300, 400, and 500 levels, including a minimum of 6 additional units in industrial education, with adviser approval .....	14
	45

See COURSES OF INSTRUCTION section of the catalog for description of courses in Industrial Technology and other subjects.

- \* The student may be permitted a non-thesis/project option by accomplishing all of the following steps:
1. Obtaining approval of the adviser and the Industrial Arts Graduate Studies Committee.
  2. Substituting 5 units of 500 level course work which support this professional degree and are approved in advance by the above committee.
  3. Passing a comprehensive written examination covering the graduate program.

# MECHANICAL ENGINEERING DEPARTMENT

Department Head, Raymond G. Gordon

Robert W. Adamson  
James G. Andresen  
Edward H. Baker  
Franklin S. Crane  
Otto C. Davidson  
Edward R. Garner

John J. Kane  
Roger A. Keech  
Fredrick B. Malmborg  
James L. Meriam  
Ronald S. Mullisen  
Lawrence H. Nelson

Leon F. Ostayee  
D. John Price  
Charles R. Russell  
Ramesh T. Shah  
William B. Stine  
Edward O. Stoffel

Mechanical engineering concerns itself primarily with the design, construction, and use of a wide variety of equipment ranging from manufacturing machinery and power generation equipment to consumer goods. Of primary concern to the mechanical engineer is the proper application of rigid, fluid, and thermal mechanics in the design and use of this equipment.

Graduates obtain employment primarily with manufacturers, contractors, public utilities, and governmental agencies. Types of work performed by graduates include design, engineering sales, engineering test, supervision of manufacture and erection.

The curriculum gives the student a thorough grounding in mechanical engineering and a choice of a curricular concentration in nuclear engineering or in general professional specialties as approved by the adviser. Engineering courses are found in all four years. In the junior and senior years, the professional specialties include such courses as turbomachinery, mechanical design, heat and mass transfer, mechanical control systems, and nuclear power plants. The curriculum is accredited by the Engineers' Council for Professional Development.

Laboratories are an important part of the student's education. The student is enrolled in mechanical engineering laboratories from the beginning of the freshman year until graduation. These laboratories include work in power generation, fluid flow, heat transfer, vibration, strength of materials, and others.

There are two organized student clubs in the Mechanical Engineering Department: a student branch of the American Society of Mechanical Engineers and a student branch of the Society of Automotive Engineers. These clubs offer students an active program of professional and social activity.

## CURRICULAR CONCENTRATIONS

### Nuclear

The nuclear concentration places emphasis on nuclear energy for those who may wish to develop a particular expertise in design for use of nuclear power.

### General

The term "general" is used to distinguish the variety of programs available under traditional mechanical engineering from the nuclear concentration, above.

## CURRICULUM IN MECHANICAL ENGINEERING

Freshman	F	W	S
# Thermal and Mechanical Systems (ME 136-146, 134) .....	3	3	
Applied Descriptive Geometry (ETME 141) .....	2		
Engineering Drawing Systems (ETME 142) .....			2
* Manufacturing Processes .....	2	1	2
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Chemistry (Chem 124, 125) .....	4	4	
General Physics (Phys 131) .....			4
Freshman Composition (Engl 104, 105) .....		3	3
Physical Education activity .....	1	1	1
	16	16	16

# Qualified transfer students may, with departmental approval, substitute ME 234 and 2 units of approved technical electives.

\* Chosen from ETMP 144; IE 141; ETWT 144; and either IT 141 or 327.

Sophomore	F	W	S
Engineering Mechanics (ME 211, 212) .....	3		4
Strength of Materials (CE 208, 209) .....		3	3
Materials Engineering (Met 306) .....		3	
Materials Engineering Laboratory (Met 341) .....		1	
Modern Physics (Phys 210) .....			4
Calculus, Differential Equations (Math 241, 242) .....	4	4	
Advanced Engineering Mathematics (Math 318) .....			4
General Physics (Phys 132, 133) .....	4	4	
Digital Computer Applications (Engr 251) .....			2
Survey of Economics (Econ 201) .....	3		
American Government (Pol Sc 201) .....	3		
	17	15	17
Junior			
Introduction to Design (ME 327) .....		5	
Thermodynamics (ME 302, 303) .....	3	3	
Fluid Mechanics (ME 341, 342) .....		3	3
Fluid Mechanics Laboratory (ME 345) .....			1
Mechanical Vibrations (ME 316) .....	3		
Vibrations Laboratory (ME 317) .....	1		
Heat Transfer (EnvE 313) .....		3	
Electric Circuit Theory (EE 201) .....	3		
Electric Circuits Laboratory (EE 261) .....	1		
Electronics (EL 321) .....		3	
Electronic Laboratory (EL 361) .....		1	
Energy Conversion and Electromagnetics (EE 325) .....			3
Energy Conversion Laboratory (EE 365) .....			1
Engineering Economy (IE 415) .....	2		
American Democracy and World Affairs (Hist 206) .....	5		
Psychology (Psy 202 or 311) .....			3
Life Science .....			3
†† Electives and courses to complete major .....			4
	18	18	18
Senior			
Mechanical Control Systems (ME 422) .....	4		
Undergraduate Seminar (ME 463) .....	2		
Senior Project (ME 461, 462) .....		2	2
Literature or Philosophy .....	4	4	
Humanities .....			3
Thermodynamics Laboratory (ME 343) .....		1	
Thermal Systems Design (ME 440) .....			3
†† Electives and courses to complete major .....	8	9	8
	18	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Mechanical Engineering and other subjects.

†† 20 of the elective units must be chosen in a field of concentration. Concentration lists are available at the departmental office.

# METALLURGICAL AND WELDING ENGINEERING DEPARTMENT

Department Head, Richard C. Wiley

Harry H. Honegger

Robert B. Leonesio

Orien W. Simmons

George T. Murray

The Metallurgical Engineering Department prepares students for employment as metallurgical engineers, and also provides service courses in metallurgy to students in other departments. The curriculum is accredited by the Engineers' Council for Professional Development. It offers opportunity to pursue specialized metallurgical areas on an elective basis in the senior year.

Students who graduate as metallurgical engineers are employed by private industry and government agencies to deal with problems of design and manufacture of metals and alloys, corrosion protection, nondestructive testing, application of materials to specific needs and requirements including process development. Typical position titles are metallurgist, metallographer, materials engineer, welding engineer, nondestructive test engineer, and inspection and quality control specialist.



The Metallurgical Engineering Department is well equipped with various laboratories and shops. There are two metallurgical engineering laboratories for student use. The metallography laboratory is equipped with the latest instruments for study of internal structures of metals and alloys. The metallurgy laboratory includes equipment for vacuum melting and processing, heat treatment, nondestructive testing, air melting furnaces, a "wet" laboratory, and a physical testing laboratory.

The Department sponsors a student chapter of the national society, The American Society for Metals. The chapter offers an active program of professional and social activity.

## CURRICULUM IN METALLURGICAL ENGINEERING

Freshman	F	W	S
Introduction to Metallurgy (Met 121) .....	3		
* Manufacturing Processes .....		2	2
General Chemistry (Chem 124, 125) .....	4	4	
General Physics (Phys 131) .....			4
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
Freshman Composition (Engl 104) .....	3		
General Psychology (Psy 202) .....		3	
§ Life Science .....	3		
Report Writing (Engl 218 or Engl 105) .....		3	

\* Select a total of 4 units from the following: ETWT 144; ETMP 144; Engr 302.

§ To be selected in accordance with the General Education requirements.



	F	W	S
Physical Education activity .....			1
§ Literature or Philosophy .....			4
Electives .....			2
	17	16	17
<b>Sophomore</b>			
Materials Engineering (Met 306).....	3		
Materials Engineering Laboratory (Met 341) .....	1		
Physical Metallurgy (Met 222) .....		4	
Nonferrous Alloys (Met 223) .....			2
Digital Computer Applications (Engr 251).....	2		
Engineering Mechanics (ME 211, 212) .....		3	4
General Physics (Phys 132, 133) .....	4	4	
Analytic Geometry and Calculus (Math 241) .....		4	
Differential Equations (Math 242) .....			4
American Democracy and World Affairs (Hist 206) .....			5
American Government (Pol Sc 201).....	3		
Survey of Economics (Econ 201).....	3		
Physical Education activity .....	1		
Electives .....		2	1
	17	17	16
<b>Junior</b>			
Theory of Materials (Met 301, 302, 303) .....	4	4	4
Metallurgical Engineering (Met 324, 325, 326) .....	4	4	4
Statistical Analysis (Stat 321, 322).....	3		3
Strength of Materials (CE 208, 209) .....	3	3	
Heat Transfer (EnvE 313) .....			3
Physical Chemistry (Chem 305, 306) .....		3	3
§ Humanities elective .....	2		
Physical Education activity .....		1	
Electives .....		2	
	16	17	17
<b>Senior</b>			
Advanced Theory of Materials (Met 421, 422, 423) .....	4	4	4
Applied Metallurgical Engineering (Met 424, 425, 426) .....	4	4	4
Senior Project (Met 461, 462).....	2	2	
Undergraduate Seminar (Met 463) .....			2
Electric Circuit Theory (EE 201) .....	3		
Electric Circuit Laboratory (EE 261).....	1		
Electronics (EL 321) .....		3	
Electronic Laboratory (EL 361).....		1	
Advanced Technical Topic .....	3		
§ Humanities elective (300 Series) .....		3	
§ Literature or Philosophy elective.....			3
Electives .....			3
	17	17	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Metallurgical Engineering and other subjects.

§ To be selected in accordance with the General Education requirements.

# School of Human Development and Education



## SCHOOL OF HUMAN DEVELOPMENT AND EDUCATION

Carl C. Cummins, Dean

Mary Lou White, Associate Dean

The School of Human Development and Education offers several major curricula leading to Bachelor of Science, Master of Arts, and Master of Science degrees. In addition, each department provides courses which are designed to serve all other departments in the University in offering experiences to students that enhance their general education.

Departments offering a major are Child Development, Home Economics and Physical Education. The Psychology Department offers a wide range of electives for students majoring in other fields. Master's degrees are offered in Education, Home Economics, and Physical Education. The Bachelor of Arts in Liberal Studies is offered in connection with the teacher education program. The School, through the Education Department, assists in the coordination of a campus-wide teacher education program and in the preparation of individuals seeking teaching, counseling or administrative services, reading and special education specialist credentials.

The School has taken the leadership in the sponsorship or direction of numerous community oriented projects which are timed to meet social needs in cooperation with local, state and federal agencies. One such project is the High School Equivalency Program.



The University supports a strong cocurricular program, and to this end the School of Human Development and Education provides valuable experience in intramural sports activities. Specialized cocurricular activities include: California Association for Health, Physical Education and Recreation, Student California Teachers Association, Phi Upsilon Omicron (Home Economics), Orchesis, American Home Economics Association, California Park and Recreation Association and National Recreation and Park Association.

# CHILD DEVELOPMENT DEPARTMENT

Department Head, David L. Englund

Robert L. Blodget

Ned W. Schultz

W. Fred Stultz

Robert A. Christenson

Josephine S. Stearns

Bette W. Tryon

Basil A. Fiorito

The curriculum in Child Development covers many aspects of child and family development. The objectives of the department are to prepare competent and sensitive professionals in child and family-related fields and to share an appreciation and understanding of human developmental processes with the university community.

The department's curricula are multi-disciplinary. Course work is provided in the Schools of Communicative Arts and Humanities, Science and Mathematics, and the Division of Social Sciences as well as in the School of Human Development and Education. The Child Development Department operates five infant and preschool laboratory programs on campus and places upper-division students in many professional internships in San Luis Obispo County schools and agencies as part of the "learning by doing" educational process.

## CURRICULAR CONCENTRATIONS

### Child Development Concentration

The Child Development Concentration prepares men and women for teaching, management and specialist positions with public or private institutions in the U.S. or overseas, or for graduate work leading to college or university teaching or other professional positions requiring postbaccalaureate credentials. Child Development graduates may plan for careers in preschool and day-care settings, in multicultural programs and in other kinds of programs that serve infants, preschool and school-age children, adolescents or parents. Students may also pursue coursework leading to the Multiple Subjects Credential program for public elementary school teachers.

### Family Studies Concentration

The Family Studies Concentration is an interdisciplinary program designed to provide the knowledge and experience necessary for a variety of careers in family, social service and counseling-related agencies in the public or private sectors. This concentration is particularly appropriate for students who wish to work in educational or helping agencies and who desire an individual or family developmental focus rather than a broad social science perspective at the undergraduate level. Many students in this concentration will pursue further graduate-level training in a variety of specializations.

## CURRICULUM IN CHILD DEVELOPMENT

Freshman	F	W	S
Orientation (CD 101) .....	2		
Pairing and Marriage (CD 103) .....	3		
Child, Family, and Community (CD 108) .....			3
Observation of Human Behavior (CD 129) .....		3	
Laboratory I: Beginning Study of Children and Families (CD 130) ....		3	
General Psychology (Psy 201/202) .....		3	
English Composition (Engl 104, Engl 105 or 300) .....	3	3	
Introduction to Sociology (Soc 105) .....			3
Social Problems (Soc 106) .....			3
Biology (Bio 101) .....	3		
Mathematics (Math 109/111/113) .....			3
Art .....		3	
Physical Education activity .....	1	1	
Health Education (PE 250) .....			2
Safety and First Aid (PE 280) .....	2		
* Electives and courses to complete major concentration .....	2		2
	16	16	16

\* Of the total elective units, 24-25 shall be chosen in a field of concentration with the approval of the student's advisor.

Sophomore	F	W	S
Family Development (CD 203) .....	3		
Infancy and Toddler Development (CD 227) .....	3		
Preschool and Middle Childhood Development (CD 228) .....	3		
Preschool Activities Planning (CD 229) .....			3
Laboratory II: Children and Families in the Preschool Milieu (CD 230) .....			4
‡ Children's Drama (Th 347) .....		3	
Music (Mu 100/101/204/205) .....		3	
Natural Science elective .....		3	3
Principles of Speech (Sp 200) .....		3	
** Children's Literature (Engl 260) .....	3		
American History (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Nutrition (HE 210) .....			3
Cultural Anthropology (Ant 201) .....	3		
Physical Education activity .....		1	
* Electives and courses to complete major concentration .....	<u>1</u>	<u>1</u>	<u>1</u>
	16	16	16
Junior			
Ethnic Minorities: Children and Families (CD 301) .....		3	
Ethnic Minorities: Children and Families (CD 302) .....			3
Survey of Economics (Econ 201) .....		3	
American Government (Pol Sc 201) .....			3
Natural Science elective .....	3		
Physical Sciences elective .....	3		
Maternal and Child Nutrition (HE 310) .....	3		
Consumer Role of the Family (HE 203) .....			3
Human Inheritance (Bio 302) .....		3	
Human Sexuality (Psy 303) .....	2		
* Electives and courses to complete major concentration .....	<u>5</u>	<u>7</u>	<u>7</u>
	16	16	16
Senior			
Parent-Child Relationships (CD 413) .....	3		
§ Senior Project (CD 461, 462) .....	2	2	
Undergraduate Seminar (CD 463) .....			2
Abnormal Psychology (Psy 307) .....		3	
Social Psychology (Psy 401) .....	3		
Literature or Philosophy .....			3
* Electives and courses to complete major concentration .....	<u>8</u>	<u>11</u>	<u>11</u>
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for description of courses in Child Development and other subjects.

‡ Family Studies Concentration students may take any theatre course.

\*\* Family Studies Concentration students may take any literature course.

\* Of the total elective units, 24-28 shall be chosen in a field of concentration with the approval of the student's adviser.

§ One quarter of CD 330 or CD 453 shall have been successfully completed before the student will be permitted to enroll in Senior Project (CD 461).

## EDUCATION DEPARTMENT

Department Head, Walter P. Schroeder

William W. Armentrout	Edward J. Ernatt	Robert L. Levison
Donald E. Cheek	Margaret Glaser	Louis D. Pippin
John E. Connely	Homer E. Hoyt	David J. Sanchez
Leonard Davidman	Valerie J. Janesick	Bernard A. Troy
Erland G. Dettloff	Jack B. Jones	J. Barron Wiley
Marilynn F. Dorsey	Richard V. Jones	

The Education Department faculty, in addition to teaching professional courses, advises fifth-year and graduate students who are working toward initial teaching and advanced credentials. Students planning to teach in elementary school should refer to the degree program in Liberal Studies. In addition, the department offers a number of courses which are classified as Ethnic Studies and designed to facilitate the study of various cultures and subcultures, their origins, development, contributions, and changing characteristics.

The University offers the following subject matter programs which have been approved by the Commission for Teacher Preparation and Licensing to meet the single subject examination waiver requirement:

### Single subject waivers for:

Agriculture

English

Government

History

Home Economics

Industrial Arts

Life Science

Mathematics

Physical Education

Physical Science

Social Sciences

### Subject matter program:

Agricultural Management, Agricultural Engineering, Agricultural Science, Animal Science, Crop Science, Dairy Science, Food Science, Fruit Sciences, Mechanized Agriculture, Natural Resources Management, Ornamental Horticulture, Poultry Industry, Soil Science

English, English/Speech

Political Science

History

Home Economics

Industrial Arts

Biological Sciences

Mathematics

Physical Education

Physical Science

History, Political Science, Social Sciences

The Education Department offers the Master's Degree in Education; and professional courses in elementary school teaching, secondary school teaching, administrative services, pupil personnel services, reading and special education-learning handicapped. It provides for preparation of persons to teach vocational subjects in the schools and advisement for the Bachelor of Vocational Education Degree. Instruction is also given in administrative and supervisory phases of vocational education.

Instructors in many departments at California Polytechnic State University help students develop subject competence and methods of teaching. Each teaching candidate is prepared to be a professional staff member in a public school. An institutional approach to teacher education is provided by the University Coordinating Committee for Teacher Education. Excellent relationships with community and school district personnel enable teaching candidates to engage in a variety of beneficial experiences.

The Education Department provides coordination for the following teacher credential programs which are approved by the State Commission for Teacher Preparation and Licensing:

Administrative Services

Agricultural Specialist

Designated Subjects

Multiple Subjects (Elementary School)

Pupil Personnel Services—Counseling, Child Welfare and attendance

Reading Specialist

Single Subjects (Secondary School)

Special Education Specialist—Learning Handicapped

All credential work is offered in the competency-based format and in close cooperation with the public schools where field experience is provided.

The University presently offers in several departments a number of courses which are classified as ethnic studies designed to facilitate the study of various cultures and subcultures, their origins, development, contributions, and changing characteristics. The underlying premise is that in studying the society and culture of a people, a combination of several disciplines can be utilized to produce comparative insights and a more comprehensive knowledge needed by teachers and other education professionals.

The Education Department works with other departments to offer courses leading to professional competence in multicultural and bilingual education needed for pre-service and in-service education of school district personnel.

The Education Department operates a Reading Development Center and a Reading Clinic providing a broad range of instruction in basic reading, diagnosis, remediation, and curriculum planning for reading in the elementary and secondary schools. The center uses the latest equipment and instructional materials in the preparation of persons to teach reading or to be a reading specialist in the elementary or secondary school.

Additional specialized learning laboratories provide resources for courses in instructional media, learning processes, and curriculum and methods.



### CURRICULUM FOR THE MASTER OF ARTS DEGREE IN EDUCATION

Candidates may, on advisement, pursue programs leading to several specializations designed to meet the particular needs of individual students.

The specializations available are Administrative Services, Counseling and Guidance, Curriculum and Instruction, Reading, and the Special Interest Option. All programs require a minimum of 45 quarter units of acceptable graduate work with 12 units of core courses and a minimum of 24 units of 500 series courses.

The Special Interest Option is ideally suited for persons seeking to fulfill career goals which are compatible with the curriculum of the Education Department and related courses in other departments. In addition to the core courses the candidate will select, in consultation with the advisor, courses in Education and other subject fields in order to design a unified program of study in such graduate areas as art education, career education, environmental education, multicultural education, science education, social science education, special education, and others. See *Graduate Studies Announcement* for further details.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Education and other subjects.

## HOME ECONOMICS DEPARTMENT

Department Head, Harry J. Busselen, Jr.

Connie Breazeale  
Sarah E. Burroughs  
Ruth James

Lezlie A. Labhard  
Karen S. Moerman  
Krishnakumar S. Morey

Mildred E. Roske  
Patricia Saam  
Barbara P. Weber

The principal objectives of the Home Economics Department are to provide educational preparation for: (1) teachers of home economics in the secondary schools, (2) managers and dietitians in food service programs. In addition, persons with a more general interest in home economics will find the curricula prepare for other occupational pursuits and provide a sound basis for successful family and personal life. Students are invited to consult with the department concerning their special interests in the field of home economics.



In addition to providing general education courses, the curricula place considerable emphasis upon applied courses during the first two years and provide other courses basic to the advanced work in the later years.

The Home Economics Department offers two related bachelor of science degree programs: Dietetics-Food Administration and Home Economics. A graduate program leading to the Master of Science in Home Economics also is offered.

### Dietetics-Food Administration

The Dietetics-Food Administration curriculum fulfills the academic requirements for admission to a Dietetics internship or equivalency which must be completed before qualifying for registration as a dietitian with the American Dietetic Association. It also prepares the graduate for careers in the field of food administration. Graduates are sought for administrative management, therapeutic teaching, research, and public service positions in hospitals, clinics, schools, governmental agencies, and public eating facilities. Graduates are also prepared to pursue graduate work in dietetics, foods or nutrition.



## Home Economics

This degree program is designed to give a foundation in all areas of home economics. Careful choice of electives with the help of an adviser will provide preparation for professional home economics positions in interior design, textiles-clothing, secondary home economics teaching, and other areas.

In addition to the required courses, students preparing to teach home economics are required to complete credential requirements specified by the Home Economics and Education Departments.

## CURRICULUM IN DIETETICS-FOOD ADMINISTRATION

Freshman	F	W	S
Introduction to Foods (HE 121) .....		4	
Design Analysis for Home Economics (HE 122) .....	3		
Family Development (CD 203) .....			3
General Chemistry (Chem 121, 122) .....	4	4	
English Composition (Engl 114, 115) .....		4	4
Introduction to Sociology (Soc 105) .....			3
Mathematics (Math 113, 114, or 118) .....	3		
Physical Education activity .....	2		
Health Education (PE 250) .....	2		
Art elective .....			3
Principles of Accounting (Actg 221, 222) .....		4	4
Electives .....	3		
	17	16	17
Sophomore			
Consumer Role of the Family (HE 203) .....			3
Problems of Family Housing (HE 207) .....	3		
Nutrition (HE 210) .....		3	
Home Food Conservation (HE 226) .....	2		
Meat Procurement and Use (FdSc 209) .....		3	
Elementary Probability and Statistics (Stat 211) .....			3
General Zoology (Zoo 131) .....		4	
Survey of Organic Chemistry (Chem 226) .....	4		
General Bacteriology (Bact 221) .....			4
Purchasing (Mgt 206) .....	3		
General Psychology (Psy 201 or 202) .....			3
Principles of Speech (Sp 200) .....		3	
Physical Education activity .....		1	
Survey of Economics (Econ 201) .....		3	
Electives .....	4		3
	16	17	16
Junior			
Maternal and Child Nutrition (HE 310) .....			3
Food Management (HE 321) .....	3		
Advanced Nutrition (HE 328) .....		4	
Advanced Nutrition Laboratory (HE 348) .....		2	
Human Anatomy and Physiology (Zoo 237, 238, 239) .....	3	3	3
Biochemistry (Chem 328) .....	4		
Behavior in Organizations (Psy 302) .....	3		
The Learning Process (Ed 335) .....		3	
Human Resources Management (Mgt 314) .....			4
Literature elective .....			3
Cultural Anthropology (Ant 201) .....		3	
Electives .....	4	2	3
	17	17	16

Senior	F	W	S
Community Nutrition (HE 410) .....	3		
Methods of Teaching Nutrition (HE 415) .....		3	
Cultural and Aesthetic Aspects of Food (HE 421) .....			3
Quantity Cookery (HE 425) .....	3		
Food Production Management (HE 426) .....		3	
Equipment and Layout (HE 427) .....			3
Diet Therapy (HE 429) .....	4		
Senior Project (HE 461, 462) .....		2	2
Undergraduate Seminar (HE 463) .....		2	
Food Microbiology (Bact 421) .....	4		
Philosophy elective .....			3
American Government (Pol Sc 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Electives .....		3	2
	17	16	16

### CURRICULUM IN HOME ECONOMICS

<b>Freshman</b>			
Family Development (CD 203) .....		3	
Introduction to Foods (HE 121) .....	4		
Design Analysis for Home Economics (HE 122) .....		3	
Clothing Construction (HE 131) .....			3
English Composition (Engl 114) .....	4		
Physical Education activity .....		2	
* Mathematics .....	3		
** Art elective .....	3		
Health Education (PE 250) .....			2
Introduction to Sociology (Soc 105) .....			3
General Chemistry (Chem 121, 122) .....		4	4
Electives .....	3	5	5
	17	17	17
<b>Sophomore</b>			
Consumer Role of the Family (HE 203) .....	3		
Problems of Family Housing (HE 207) .....		3	
Nutrition (HE 210) .....			3
§ Individual, Family and Society (CD 108) .....		3	
Interior Design (HE 242) .....			4
Psychology elective .....	3		
***Principles of Speech (Sp 200) .....			3
Physical Education activity .....		1	
Survey of Economics (Econ 201) .....	3		
At least 7 units from:			
Chem 226, Zoo 131, Bact 221, Bio 101, Bot 121 .....	3	4	
Electives .....	4	5	6
	16	16	16

\* Math 109 recommended for students who need basic review.

\*\* To be selected in accordance with General Education requirements.

§ CD 130 may be substituted with prior approval of adviser.

\*\*\* Speech 200 and English 300 required for credentialing in teaching program.

Junior	F	W	S
Maternal and Child Nutrition (HE 310) .....		3	
Food Management (HE 321) .....	3		
Textiles (HE 322) .....	3		
Management of Family Resources (HE 324) .....			3
Demonstration Techniques (HE 326) .....		3	
Household Equipment (HE 331) .....			4
***Report Writing or Advanced Composition (Engl 218 or 300) .....		3	
Dynamics of Clothing (HE 341) .....		3	
** Literature or Philosophy .....			3
Electives .....	11	5	6
	17	17	16
Senior			
Senior Project (HE 461, 462) .....	2	2	
Undergraduate Seminar (HE 463) .....	2		
American Government (PolSc 201) .....	3		
† American Democracy and U.S. in World Affairs (Hist 204, 205) .....		3	3
** Philosophy or Literature .....	3		
Electives .....	6	12	13
	16	17	16

### CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For University requirements see the *Graduate Studies Announcement*)

Required:	Units
HE 511 Research Design .....	3
HE 580 or 582 Graduate Seminar .....	3
HE 599 Thesis or additional approved course work and comprehensive examination .....	6
Courses in the general field of Home Economics selected from 500 series level.....	12
Courses in major area(s) of interest selected from 400 and 500 series level.....	12
Electives selected from 400 to 500 series level .....	9
	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Home Economics and other subjects.

\*\*\*Speech 200 and English 300 required for credentialing in teaching program.

\*\* To be selected in accordance with General Education requirements.

†History 206 may be substituted for History 204 and History 205. Students taking History 206 must take a minimum of one additional unit in the humanities in accordance with the General Education requirements.

# LIBERAL STUDIES

Interdisciplinary Program  
Coordinator, John B. Connely

The Bachelor of Arts in Liberal Studies is a degree major designed primarily to provide the undergraduate preparation for the student who intends ultimately to satisfy requirements for a teaching credential authorizing multiple subject instruction, i.e., elementary school teaching.

Students who find the teaching credential objective unrealistic after diligently pursuing the Liberal Studies major to the point of entry into the University credential program, may at that point change to another major or complete a B.A. in Liberal Studies by satisfying the academic emphasis on the curriculum display below. Applications for or changes of major into the Liberal Studies major will be discouraged from any student who does not have a genuine intent and the minimum scholastic standing (2.5 g.p.a.) for successfully completing the multiple subjects teaching credential program as constituted on this campus.

## CURRICULUM IN LIBERAL STUDIES

Freshman	F	W	S
Natural History (Bio 127, 128, 129) .....	3	3	3
Algebra (Math 113) .....	3		
English Composition (Engl 114, 115) .....	4	4	
Children's Literature (Engl 260) .....			3
Oral Interpretation: Children's Literature (Sp 310) .....			3
Cultural Anthropology (Ant 201) .....		3	
American Government (Pol Sc 201) .....		3	
General Psychology (Psy 201 or 202) .....			3
Topics in California History (Hist 385) .....			3
Introduction to Sociology (Soc 105) .....	3		
Music Fundamentals—Applied (Mu 100) or Music Theory (Mu 101) .....	3		
Introduction to Art (Art 111) .....		3	
Physical Education activity .....			1
	16	16	16
Sophomore			
Structure and Behavior of Matter (PSc 101, 102) .....	4	4	
Earth and Space Science (PSc 303) .....			4
Contemporary Grammar and Composition (Engl 392) .....	4		
Literature (Engl 200–300) .....		4	
Global Geography (Geog 308) .....			3
American Democracy and World Affairs (Hist 206) .....	5		
Survey of Economics (Econ 201) .....	3		
Introduction to Art Materials (Art 104) .....		3	
Fundamentals of Drawing (Art 101) or Introduction to Crafts (Art 141)			3
Music Appreciation (Mu 204) or Ethnic Music of the World (Mu 208)		3	
Contemporary Ideas (Hum 270) or Creative Ideation (Hum 340) .....			3
Children's Theatre (Th 347) .....			3
Drug Education (PE 305) or Health Education (PE 250) .....		2	
	16	16	16
Junior—Academic			
Modern Elementary Math (Math 327, 328, 329) .....	3	3	3
Human Ecology (Bio 301) .....	3		
Restricted elective from: Literature (Engl 200–300) or Introduction to Communicative Disorders (Sp 302) .....		4	
Voice and Articulation (Sp 206) or Phonetics (Sp 306) .....	3		

	F	W	S
Concepts in World Civilization (Hist 303) .....	4		
Geography (300-400) .....		3	
Restricted elective from: Political Science (300-400) or Sociology (300-400) .....			3
Literature (Engl 300-400) or Speech Practices (Sp 406) .....			4
Music for Children (Mu 301) .....	3		
Humanities and Fine Arts elective .....		3	
Electives .....		3	3
	16	16	13
<b>Junior—Credential</b>			
Modern Elementary Math (Math 327, 328, 329) .....	3	3	3
Human Ecology (Bio 301) .....	3		
Restricted elective from: Literature (Engl 200-300) or Introduction to Communicative Disorders (Sp 302) .....		4	
Voice and Articulation (Sp 206) or Phonetics (Sp 306) .....	3		
Learning Processes (Ed 335) .....	3		
Music for Children (Mu 301) .....	3		
Geography (300-400) .....		3	
Methods of Teaching Reading (Ed 435) .....			3
Humanities and Fine Arts elective .....		3	
Curriculum and Methods in Elementary School Reading (Ed 434) .....		2	
Instructional Processes (Ed 438) .....			3
Multicultural Education (Ed 301) .....			3
Political Science (300-400) or Sociology (300-400) .....			3
	15	15	15
<b>Senior—Academic</b>			
Restricted elective from: Art or Music or History in the Elementary School (Hist 423) .....	2		
Foreign Language .....	5	5	5
* Restricted electives .....	5	7	10
Senior Project (Hum 461) .....	3		
Electives .....		3	
	15	15	15
<b>Senior—Credential</b>			
Restricted elective from: Art or Music or History in the Elementary School (Hist 423) .....	2		
Student Teaching (Ed 430, 440) .....	6	12	
Organizing and Teaching Multiple Subjects (Ed 424) .....	3		
Diagnosis, Prescription and Evaluation (Ed 436) .....	2		
Senior Project Practicum (Ed 451) .....		3	
Concepts in World Civilization (Hist 303) .....			4
Restricted elective from: Literature (Engl 300-400) or Communication in Children's Environments (Sp 406) .....			4
Electives .....	3		6
	16	15	14

- \* Two emphases of at least 18 units each must be acquired within the total degree program, at least 12 units of each emphasis must be 300-400 level course work. The two emphases and the courses are to be selected with the adviser's approval.

# PHYSICAL EDUCATION DEPARTMENT

Department Head, Jimmy H. Railey

Richard A. Anderson  
Catherine Barthels  
Andrew Brennan  
Victor A. Buccola  
F. Stuart Chestnut  
John H. Crivello  
David W. Grosz  
F. Sheldon Harden  
Richard R. Harper  
Berdy V. Harr  
Dwayne G. Head

Richard Heaton  
William R. Hicks  
Thomas L. Hinkle  
Vaughan Hitchcock  
Bobbie A. Lane  
Thomas J. Lee  
Robert E. Meyers  
Steve Miller  
Evelyn I. Pellaton  
Andrew J. Proctor

James D. Sanderson  
Carolyn Shank  
Mary L. Stallard  
Moon Ja Minn Suhr  
James L. Webb  
Ernest J. Wheeler, Jr.  
Marylinda Wheeler  
Michael Wilton  
Thomas M. Wood  
Steve Yoneda

The Physical Education Department prepares both men and women as secondary school teachers in the field of physical education. Another function of the department is to provide both required and elective courses in physical education and recreation to meet the general education needs of all students. To supplement this general education, the department administers an extensive intramural sports program for all students of the University. In addition, a major in Recreation Administration offers an opportunity for students to prepare for employment in a variety of positions in the field of Recreation Administration.

Because of an ideal geographical location and outstanding physical education facilities, the University has become a center for workshops held by the health and physical education organization of the State.

Extensive outdoor facilities include a number of turfed areas for physical education classes and intramural sports activities. A football stadium, regulation baseball diamond with permanent stands and quarter-mile track provide outstanding facilities for intercollegiate athletic teams. An additional track is available for instructional and intramural activities. Basketball, volleyball, handball, shuffleboard, tennis courts with outdoor lighting and a competitive swimming pool are used for instruction and student recreation.

The Physical Education Building provides excellent facilities for all phases of the total physical education and intercollegiate athletic program. The main gymnasium has a championship basketball court, three intramural basketball courts, several volleyball and badminton courts, a wrestling room weight training area and a human performance laboratory.

Crandall Gym also provides facilities for basketball, volleyball, badminton and gymnastics.

## CURRICULUM IN PHYSICAL EDUCATION

Freshman	F	W	S
Freshman Composition (Engl 104, 105) .....	3	3	
Mathematics (Math 114) .....	3		
Health Education (PE 250) .....			2
Professional activity series (PE 206-239) .....		2	2
The Physical Environment (PSc 101, 102) .....		4	4
General Zoology (Zoo 131) .....	4		
Introduction to Physical Education (PE 270) .....	2		
History and Philosophy of Physical Education (PE 274) .....		3	
* Social Science elective .....			3
Safety and First Aid (PE 280) .....	2		
Principles of Speech (Sp 200) .....		3	
American Government (PoS 201) .....			3
Electives and courses to complete major .....	3	1	3
	17	16	17

\* Courses to be selected according to the General Education requirements.

Sophomore	F	W	S
Elementary Probability and Statistics (Stat 211) .....	3		
Statistical Methods (Stat 212) .....		3	
Professional activity series (PE 206-239) .....		2	
General Psychology (Psy 201 or 202) .....	3		
U.S. and World Affairs (Hist 205) .....			3
Growth of American Democracy (Hist 204) .....		3	
Human Anatomy and Physiology (Zoo 237, 238, 239) .....	3	3	3
Nutrition (HE 210) .....			3
* Humanities .....			3
Electives and courses to complete major .....	8	5	5
	17	16	17
Junior			
Human Muscle Anatomy (Zoo 340) .....	2		
Kinesiology (PE 302) .....		3	
Physiology of Exercise (PE 303) .....			3
Tests and Measurements (PE 319) .....	3		
* Literature or Philosophy .....			3
Electives and courses to complete major .....	11	14	11
	16	17	17
Senior			
Adaptive Physical Education (PE 406) .....			3
Senior Project (PE 461, 462) .....	2	2	
Organization and Administration of Health and Physical Education (PE 401) .....	3		
* Literature or Philosophy .....		3	
Electives and courses to complete major .....	12	11	12
	17	16	15

### ATHLETIC COACHING OPTION

(Add courses below to basic curriculum)

Sophomore	Senior
PE 252 Beginning Athletic Training .... (2)	PE 410 Psychology of Coaching ..... (3)
PE 375 Teaching Team and Individual Sports..... (3)	PE 432 Athletic Training and Rehabili- tation ..... (2)
	PE 437 Directed Field Work ..... (3)
Junior	Jour 312 Public Relations ..... (3)
† Coaching ..... (12)	
PE 278, 290, 292, 294, 297, 298 Officiating (3)	

### HEALTH EDUCATION OPTION

(Add courses below to basic curriculum)

Freshman	Senior
PE 254 School Health Program..... (2)	Psy 301 Psychology of Personal Devel- opment..... (3)
CD 108 Child, Family, and Community (3)	Psy 303 Human Sexuality..... (2)
Sophomore	Senior
Soc 206 Sociology of Family Life ..... (3)	Psy 320 Behavioral Effects of Drugs and Alcohol ..... (3)
Bact 221 General Bacteriology..... (4)	HE 415 Methods of Teaching Nutrition (3)
Sp 217 Essentials of Discussion ..... (4)	PE 405 Administration of Health Educa- tion ..... (2)
Junior	
Bio 301 Human Ecology ..... (3)	

\* Courses to be selected according to the General Education requirements.

† Coaching theory courses to be recommended by adviser.

## TEACHING OPTION

(Add courses below to basic curriculum)

### Freshman

PE 206-239 Professional Activity Series (2)	PE 296 Planning Techniques in Physical Education (3)
PE 218 Aquatics (2)	

### Sophomore

PE 244 Introduction to Dance (3)	PE 332 Elementary School PE (3)
PE 206 Tumbling, Trampoline and Vaulting (2)	PE 312, 356, 358, 381, 383 Activity Theory (6)
PE 207 Apparatus (2)	PE 375 Teaching Team and Individual Sports (3)
PE 260 Intramural Sports (3)	PE 424 Organization and Teaching PE (3)
PE 252 Beginning Athletic Training (2)	
PE 278, 290, 292, 294, 297, 298 Officiating (1)	

### Senior

PE 440 Activity Supervision (3)
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## CURRICULUM IN RECREATION ADMINISTRATION

Freshman	F	W	S
Recreation and Leisure Services (Rec 101) .....	3		
Outdoor Recreation Skills (Rec 103) .....	2		
Recreation Leadership (Rec 105) .....			3
Introduction to Natural Resources Management (NRM 101) .....	3		
Recreation Systems and Management (NRM 112) .....		3	
Basic Accounting (Actg 131) .....			3
General Biology (Bio 101) .....		3	
Business Enterprise (Bus 101) .....			4
English Composition (Engl 114) .....	4		
Advanced Lifesaving (PE 143) .....	1		
Introduction to Sociology (Soc 105) .....		3	
Math elective .....		3	
Natural Science electives (from approved list) .....	3		3
Physical Education activity (PE 100-180) .....		1	1
Electives .....		3	
	16	16	14
<b>Sophomore</b>			
Programming for Leisure (Rec 210) .....			3
Recreation for People with Disabling Limitations (Rec 252) .....		4	
Business Law Survey (Bus 201) .....	3		
Report Writing (Engl 218) or Advanced Composition (Engl 300) .....		3	
Physical Geology (Geol 201) .....	3		
Health Education (PE 250) .....		2	
Intramural Sports (PE 260) .....	3		
Safety and First Aid (PE 280) .....			2
Water Safety (PE 284) .....		1	
American Government (PolS 201) .....			3
General Psychology (Psy 201 or 202) .....			3
Principles of Speech (Sp 200) .....			3
Art, Theatre or Music elective .....	3		
Natural Science elective (from approved list) .....		3	
Electives .....	3	2	3
	15	15	17
<b>Junior</b>			
Supervisory Roles in Recreation Administration (Rec 323) .....	3		
Organizational Patterns of Recreation Administration (Rec 324) .....	3		
Implementation of Outdoor Recreation Programs (Rec 337) .....			3



	F	W	S
Resource Survey (NRM 207) .....		3	
Introduction to Urban Environment (CRP 211) .....	3		
Growth of American Democracy (Hist 204) .....	3		
United States in World Affairs (Hist 205) .....		3	
Introduction to Public Administration (PoLS 214) .....		3	
Persuasion (Sp 304) or Introduction to Communicative Disorders (Sp 302) .....			4
Introduction to Philosophy (Phil 201) .....			3
Literature or Philosophy elective .....		3	
* Electives .....	3	3	6
	15	15	16
<b>Senior</b>			
Management of Recreation and Leisure Services (Rec 424) .....		3	
Directed Field Experience (Rec 430, 431) .....	3		3
Senior Project (Rec 461) .....	2		
Senior Project (Rec 462) .....		2	
Undergraduate Seminar (Rec 463) .....			2
Site Development and Maintenance (NRM 412) .....	4		
Introduction to Conservation (Cons 311) .....	3		
Public Relations (Jour 312) .....			3
Park Planning and Management (OH 337) .....		4	
Urban Sociology (Soc 313) .....			3
* Electives .....	3	6	6
	15	15	17

## CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For University requirements see the *Graduate Studies Announcement*)

Required:	Units
PE 502 Seminar in Problems of Physical Education .....	3
PE 513 Evaluation of Current Studies .....	3
PE 517 Research Methods .....	3
PE 525 Motor Learning .....	3
	12
Select 9 units with adviser approval from the following:	
PE 511 Administration of Physical Education .....	3
PE 512 Critical Health Issues .....	3
PE 522 Mechanical Analysis of Sports .....	3
PE 526 Sport in American Society .....	3
PE 530 Advanced Physiology of Exercise .....	3
	9
Additional Physical Education electives:	
A minimum of nine (9) additional graduate level units must be taken in Physical Education .....	9
Electives:	
A maximum of fifteen (15) units may be taken outside the Physical Education Department in 300, 400, and 500 level courses. Up to nine (9) units may be taken at the 300, 400 level. Nine (9) units of adviser approved 400 level Physical Education courses may be taken. ....	15
	45

For more detailed information or advisement, students should communicate with the Coordinator of Graduate Studies for Physical Education.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Physical Education, Recreation and other subjects.

\* Minimum of 15 units must be 300-400 series.

## PSYCHOLOGY DEPARTMENT

Department Head, L. Robert Sorensen

William D. Curtis  
M. Dale Federer  
Daniel Hawthorne

Peter M. Litchfield  
Linden L. Nelson

Peter Rabe  
Charles M. Slem

The Psychology program is designed to acquaint students with the facts, theories, and contemporary trends in psychology. The application of psychological principles to existing personal, social, and technological problems is emphasized throughout the department courses. Attention is placed upon individual student development of a more coherent and meaningful understanding of oneself and of one's interactions with others and with the environment.

The Psychology Department contributes to the overall academic community through its participation in the general education program, as a source of electives for the various major areas, and as a resource for increased self-awareness and development.

Psychology seeks to identify, describe, and classify the several types of activities of which the human organism is capable. Therefore, psychology provides a means of asking questions about the mental, physical, and emotional aspects of life.



# School of Science and Mathematics



# SCHOOL OF SCIENCE AND MATHEMATICS

William C. Langworthy, Dean  
Philip S. Bailey, Associate Dean

The School of Science and Mathematics offers curricula leading to the Bachelor of Science degree in Biochemistry, Biological Sciences, Chemistry, Computer Science, Environmental and Systematic Biology, Mathematics, Microbiology, Physical Science, Physics, and Statistics. Graduate programs are offered leading to the Master of Science degree in Biological Sciences, Chemistry, Computer Science, and Mathematics. The Reserve Officer Training Corps (ROTC) program is made available to all students of the university through the Military Science Department.



Courses offered by the School of Science and Mathematics meet the needs of several groups of students:

1. Students working toward Bachelor of Science, or Master of Science degrees with majors in science and mathematics.
2. Students from all majors who need to meet the requirements in General Education. These courses are required so that every graduate will be better prepared to be a participating citizen and a productive member of the State, nation, and world.
3. Students in Agriculture and Natural Resources, Architecture and Environmental Design, Business, Communicative Arts and Humanities, Engineering and Technology, Human Development and Education, Science and Mathematics and Social Sciences who require competency in subjects which support, complement, or are closely related to their areas of specialization.
4. Students planning to become elementary, secondary, or community college teachers, who need background in science and mathematics.
5. Students who need science and mathematics background in pre dentistry, premedicine (and allied fields) and preveterinary science. A Health Professions Guidance and Evaluation Committee is prepared to advise, assist, and evaluate all students, regardless of major, who plan to enter the health professions.

The School of Science and Mathematics and the School of Human Development and Education cooperate to recommend candidates for the California Teaching Credential with majors in Biological Sciences, Mathematics, and Physical Science.

## BIOLOGICAL SCIENCES DEPARTMENT

Department Head, John K. Hampton, Jr.

Frederick P. Andoli	Constance H. Gray	Maria E. Ortiz
Paraschos Babos	Randolph L. Grayson	Lee R. Parker
James S. Booth	V. L. Holland	Pratapsinha C. Pendse
Leslie S. Bowker	Dennis N. Homan	Elizabeth K. Perryman
Robert J. Brown	C. Dennis Hynes	Richard A. Pimentel
Tracey G. Call	Peter Jankay	Thomas L. Richards
Raul J. Cano	Eric V. Johnson	Rhonda L. Riggins-Pimentel
Fred L. Clogston	David Keil	Aryan I. Roest
Jaime S. Colomé	George N. Knecht	Shirley R. Sparling
Alan F. Cooper	Richard J. Krejsa	William D. Stansfield
Alvin A. DeJong	A. Mark Kubinski	John W. Thomas
Douglas D. Donaldson	Kingston L. Leong	David H. Thomson
Harry L. Fierstine	Malcolm G. McLeod	William Thurmond
Harry C. Finch	David H. Montgomery	Dirk R. Walters
Dennis F. Frey	Royden Nakamura	Archie Waterbury
Roger D. Gambos	Richard F. Nelson	Michael A. Yoshimura
David V. Grady		

The department offers complete undergraduate programs leading to Bachelor of Science degrees in Biological Sciences, Environmental and Systematic Biology, and Microbiology. For qualified students, a graduate program is available leading to the Master of Science degree. In addition, a variety of courses is offered to satisfy biology requirements in other academic majors.

The department is housed in modern facilities equipped with up-to-date instrumentation. Cal Poly's geographical setting offers unusual opportunities for studying representative plants and animals of both Northern and Southern California. Graduates of the various programs enter fields in teaching; medical and biological laboratory technology; public health; wildlife management; agriculture; industry; and private, state and national park and forest services. A significant number enter graduate or professional schools for advanced study of botany, entomology, microbiology, plant pathology, zoology, marine sciences, veterinary science, medicine and dentistry. The department offers courses required for preprofessional training in medicine and paramedical fields. In the teaching area, all state requirements may be met for an academic major in biological sciences leading to credentials in secondary teaching.

### CURRICULUM IN BIOLOGICAL SCIENCES

With the several curricular concentrations described below, this degree offers students a broad education in biology. It is suitable for preprofessional preparation in the bio-medical fields, as a base for work toward postbaccalaureate studies and for technical competency in the concentrations offered. A list of courses for the various concentrations is available in the department office.

#### Curricular Concentrations

##### **Anatomy-Physiology**

This concentration is designed for students who are interested in zoology with an emphasis in the structure and function of animals. Preprofessional students of the health sciences would select this concentration.

##### **Biology**

The general biology program is designed for the student who wants the broadest possible training.

##### **Botany**

Plant structure, physiology, ecology, diseases and classification are the basis for courses leading to competency required for persons desiring positions as botanists.

## Marine Biology

Students in this concentration may look forward to occupational and professional work in the rapidly expanding field of oceanographic studies and enterprises.

## Plant Pathology-Entomology

Students are trained to recognize, evaluate and solve plant disease and insect problems. They may be employed as technicians in research or extension service, or may continue their studies at the graduate level.

Freshman	F	W	S
General Botany (Bot 121, 122, 123) or General Zoology .....	4	4	4
General Chemistry (Chem 127, 128, 129) .....	4	4	4
Survey of Organic Chemistry (Chem 226) .....			4
English Composition (Engl 114, 115) .....		4	4
<sup>1</sup> College Algebra and Trigonometry (Math 120) .....	5		
* Physical Education.....	1	1	
** Electives and courses to complete major .....	2	3	
	16	16	16
Sophomore			
General Zoology (Zoo 131, 132, 133) or General Botany .....	4	4	4
General Bacteriology (Bact 221) .....	4		
Principles of Speech (Sp 200) .....			3
College Physics (Phys 121, 122, 123) .....	4	4	4
* Social Sciences .....		3	3
* Physical Education.....		1	
** Electives and courses to complete major .....	5	5	3
	17	17	17
Junior			
Ecology (Bio 325) .....	3		
Genetics (Bio 303).....	3		
Advanced Composition (Engl 218 or 300).....		3	
American Government (Pol Sc 201).....	3		
<sup>2</sup> Computer and Computing (CSc 110) .....		3	
* Literature or Philosophy .....	3	3	
* Humanities .....			3
Senior Project (Bio 461) .....			2
Biochemistry (Chem 328) .....		4	
General Entomology (Ent 326) .....			4
** Electives and courses to complete major .....	5	4	8
	17	17	17
Senior			
Physiology I: General (Bio 431) .....	4		
Senior Project (Bio 462) .....		2	
Undergraduate Seminar (Bio 463) .....			2
General Cytology (Bio 423) .....	4		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205).....			3
** Electives and courses to complete major .....	8	11	11
	16	16	16

<sup>1</sup> Math 118-119 will substitute, or Math 141 and any additional course in CSc, Math, or Stat.

\* To be selected in accordance with the General Education requirements.

\*\* Of the total elective units 18-23 shall be chosen in a field of concentration in the Biological Sciences with the approval of the adviser.

<sup>3</sup> CSc 101 will substitute.

## CURRICULUM IN ENVIRONMENTAL AND SYSTEMATIC BIOLOGY

The four-year program in Environmental and Systematic Biology leads to a Bachelor of Science Degree. Emphasis is placed on providing the student with training in the identification and understanding of living organisms which form the human environment, and their relationship to each other and to mankind. An environmental or systematic biologist can look toward employment with government agencies and private industries which are involved with the environment—agriculture, forestry, wildlife management, parks and recreation, and environmental monitoring agencies, or may enter the educational field. The requirements of the degree program provide the basics for a wide range of job opportunities.

Freshman	F	W	S
General Zoology (Zoo 131, 132, 133) .....	4	4	4
<sup>1</sup> General Chemistry (Chem 121, 122) .....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
English Composition (Engl 114, 115) .....		4	4
<sup>2</sup> College Algebra and Trigonometry (Math 120) .....	5		
Elementary Probability and Statistics (Stat 211) .....		3	
<sup>3</sup> Fortran Programming (CSc 101) .....			2
Soils (SS 121) .....	4		
Physical Education elective .....		1	1
	17	16	15
Sophomore			
General Botany (Bot 121, 122, 123) .....	4	4	4
Field Botany (Bot 333) .....			4
<sup>4</sup> Introductory Physics (Phys 104) .....	4		
Physical Geology (Geol 201) .....		3	
Physical Geography (Geog 250) .....			4
Social Sciences electives .....	3	3	
Physical Education elective .....			1
Electives .....	6	6	2
	17	16	15
Junior			
Genetics (Bio 303) .....	3		
Evolution (Bio 315) .....		3	
General Ecology (Bio 325) .....	3		
Plant Ecology (Bot 326) .....			4
General Entomology (Ent 326) .....	4		
Vertebrate Field Zoology (Zoo 329) .....			4
Principles of Speech (Sp 200) .....		3	
American Government (PolS 201) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
† Electives .....	4	6	4
	17	15	15
Senior			
Physiology I: General (Bio 431) .....	4		
Animal Behavior (Zoo 437) .....	4		
Senior Project (Bio 461) .....	2		

<sup>1</sup> Chem 127, 128, 129 and Chem 328 are recommended for students planning postgraduate training.

<sup>2</sup> Math 118, 119 will substitute, or Math 141 and any additional course in CSc, Math or Stat.

<sup>3</sup> CSc 110 will substitute.

<sup>4</sup> Phys 121, 122, 123 are recommended substitutes for students planning postgraduate training.

† Of the total elective units, 6 must be selected from each of two specified lists; additional information available from the department.

	F	W	S
Literature/Humanities .....	3	3	3
† Electives .....	7	9	12
	<u>16</u>	<u>16</u>	<u>15</u>

## CURRICULUM IN MICROBIOLOGY

The undergraduate program leading to the Bachelor of Science degree in Microbiology involves the study of microorganisms such as bacteria, viruses, algae, protozoa, and fungi. Special emphases are placed on their structure and function as well as their interactions with each other and with human beings.

### Curricular Options

#### Medical Technology

This option prepares students specifically for careers in medically-oriented fields: Immunology, medical bacteriology, medical mycology, virology, parasitology, hematology, and genetics.

#### Microbiology

This option provides students with modern concepts in biology as well as practical skills. Graduates are prepared to enter into positions in teaching, biomedical and other research areas, industry, public health, and into advanced degree programs.

Freshman	F	W	S
General Zoology (Zoo 131, 132) or General Botany.....	4	4	
General Chemistry (Chem 127, 128, 129) .....	4	4	4
<sup>1</sup> College Algebra and Trigonometry (Math 120) .....			5
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
English Composition (Engl 114, 115) .....	4	4	
American Government (PolS 201) .....	3		
Social Sciences .....			3
Physical Education elective .....	<u>1</u>	<u>1</u>	<u>1</u>
	16	16	16

#### Sophomore

General Botany (Bot 121, 122) or General Zoology .....		4	4
* Survey of Organic Chemistry (Chem 226) .....	4		
General Microbiology (Bact 224) .....	4		
General Microbiology (Bact 225) .....		4	
College Physics (Phys 121, 122, 123) .....	4	4	4
Literature or Philosophy .....			3
Humanities .....	3		
Social Sciences elective .....		3	
Electives and courses to complete major .....			<u>4</u>
	15	15	15

#### Junior

Quantitative Analysis (Chem 331) .....	4		
** Biochemistry (Chem 371) .....	4		
Genetics (Bio 303) .....		3	
Physiology I: General (Bio 431) .....		4	
General Virology (Bact 402) .....			3
Parasitology (Zoo 425) .....		4	
Electives and courses to complete major .....	<u>9</u>	<u>6</u>	<u>13</u>
	17	17	16

<sup>1</sup> Math 118–119 will substitute or Math 141 and any additional course in CSc, Math, or Stat.

\* Chem 316–317 will substitute for Chem 226.

\*\* Chem 328 may be substituted for Medical Technology Option only.



Senior	F	W	S
Serology and Immunology (Zoo 426) .....	4		
Medical Microbiology (Bact 423) .....			4
Senior Project (Bio 461) .....	2		
Literature or Philosophy .....		3	
Electives and courses to complete major .....	<u>10</u>	<u>12</u>	<u>12</u>
	16	15	16

### MEDICAL LABORATORY TECHNOLOGY OPTION

(Add Courses Below to Microbiology Curriculum)

#### Sophomore

Bio 321 Biological Instrumentation .... (3)	Chem 274 Chemistry of Drugs and Poisons..... (3)
Junior and Senior Years	
Bact 430 Medical Mycology ..... (4)	Chem 335-6 Quantitative Physiological chemistry ..... (7)
Bio 304 Molecular Genetics (2) or	Zoo 428 Hematology ..... (4)
Bio 255 Microtechnique (2) or	El 314 Applied Electronics for Non-Engineers ..... (4)
Bio 253 Orientation to Health Professions (1,1) or Bio 462 Senior Project (2) or Bact 403 General Virology Lab (2)	Zoo 412 Introduction to Clinical Pathology..... (3)

### MICROBIOLOGY OPTION

(Add Courses Below to Microbiology Curriculum)

#### Junior and Senior Years

Bact 333 Industrial Microbiology ..... (4)	Bio 423 General Cytology ..... (4)
Bact 421 Food Microbiology ..... (4)	Bio 463 Undergraduate Seminar..... (2)
Bact 424 Bacterial Cytology and Physiology..... (4)	Chem 372 Biochemistry ..... (4)
Bact 436 Microbial Ecology ..... (4)	Chem 373 Advanced Biochemistry..... (4)

### CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For University requirements see the *Graduate Studies Announcement*)

Two approaches to the M.S. Degree in Biological Sciences are possible, one involving only course work and a comprehensive examination, the other involving course work and a thesis. At least 22½ units of the minimum required 45 units must be at the 500 (graduate) level. All units selected must be acceptable for graduate credit. For further information, students should communicate with the head of the Biological Sciences Department.

#### Units

Courses in the biological sciences selected from 300, 400 and 500 level courses. At least three units each selected from courses having three of the following prefixes: Bact, Bio, Bot, Cons, Ent, Zoo .....	27
Seminar in Biology (Bio 590) .....	3
Thesis (Bio 599) or additional course work with comprehensive examination.....	9
Electives from 300, 400 and 500 level courses .....	<u>6</u>
	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Bacteriology, Biology, Botany, Conservation, Entomology, Zoology and other subjects.

# CHEMISTRY DEPARTMENT

Department Head, William Rife

Linda Atwood	Jerome F. Houlis	Dennis R. Phillips
Christina A. Bailey	Ralph A. Jacobson	Michael G. Silvestri
Philip S. Bailey	Dane R. Jones	Jan W. Simek
Albert C. Censullo	James Katekaru	Russell L. Tice
Robert S. Cichowski	David L. Keeling	Howard D. Walker
Lee Charles Coombs	Martin Kellerman	James D. Westover
Charles E. Dills	Bruce Kennelly	Hewitt G. Wight
Norman L. Eatough	William C. Langworthy	David G. Williamson
Leland S. Endres	John G. Maxwell	Max T. Wills
Thomas G. Frey	Neil J. Moir	Marshall S. Wright
Judith L. Fries	James M. Peters	

The Chemistry Department serves all schools of the University by providing scientific background. The department also contributes to the general education of all students by giving them a thorough foundation in the method and factual content of chemical science and the role it plays in society. The chemistry and biochemistry curricula lead to the bachelor of science degree. Graduate work is offered leading to the master of science degree in chemistry. The Chemistry and Physics Departments jointly administer a degree program in Physical Sciences for the student who intends to be a secondary school teacher in one or more of the physical sciences.

Chemistry is the branch of science which deals with the composition and changes in composition of all substances. It is a description of the world at the atomic and molecular level. A science with a scope this broad offers many fields of specialization. Chemists analyze and synthesize such products as plastics, fibers, drugs, dyes and rocket fuels. The petroleum, textile, fertilizer, pharmaceutical, paint, paper and metal industries employ large numbers of chemists for quality control and development of new products. The occupational objectives of the curricula in chemistry are to qualify students for entry at the bachelor's level into positions in government service and industry and to help prepare teachers of the physical sciences. The curriculum in chemistry prepares the student to work at the bachelor's level as an organic, analytical, physical, or inorganic chemist. In addition, graduates have entered medical, dental, veterinary, pharmacy, medical technology, and graduate schools. Courses are taught in modern laboratories making use of the latest scientific instruments.

The Chemistry Department is fully approved and accredited by the American Chemical Society. All students who complete the Chemistry major receive A.C.S. certified accreditation.

The master of science program is designed to develop professional competence for productive employment in industry, government and education. The student desiring to enter this program should complete an undergraduate major in chemistry or biochemistry with evidence of superior scholarship.

Graduate courses are offered which help to complete the requirements for the master of science degree in chemistry, and for teaching credentials.

Proper selection of electives in the curriculum in biochemistry permits specialization in nutritional, food, feed, pesticide, fertilizer or clinical chemistry. Students find employment in the laboratories of those companies devoted to the processing of food products and the production of agricultural and pharmaceutical chemicals. Positions for which the student may qualify include vitamin assay biochemist, food and drug chemist, meat technologist, fertilizer chemist, insecticide residue analyst and public health chemist.

It is recommended that the high school student planning to major in chemistry or biochemistry include at least two semesters of chemistry in high school. Students enrolling in General Chemistry or General Inorganic Chemistry are required to pass Chem 106, or the equivalent, or have the recommendation of their faculty adviser.

## CURRICULUM IN CHEMISTRY

Freshman	F	W	S
General Chemistry (Chem 127, 128, 129) .....	4	4	4
General Chemistry Laboratory (Chem 156) .....			1
English Composition (Engl 114) .....	4		
† Oral or written communication .....			3
Analytic Geometry and Calculus (Math 141, 142, 143 or Math 131, 132, 133) .....	4	4	4
† Physical Education .....	1	1	1
Biological Sciences (Bio 101, Bot 121, or Zoo 131) .....		3	
Electives .....	3	3	3
	16	15	16
Sophomore			
Quantitative Analysis (Chem 331) .....	5		
Organic Chemistry (Chem 316, 317, 318) .....	4	5	5
General Physics (Phys 131, 132, 133) .....	4	4	4
Mathematics (Math 241, 242) or Statistics or Computer Science .....		4	4
Chemical Literature (Chem 253) .....		1	
† Social Sciences electives .....			3
Electives .....	3	2	
	16	16	16
Junior			
* Approved Chemistry Elective .....	3	4	
Physical Chemistry (Chem 305, 306, 307) .....	3	3	4
Physical Chemistry Laboratory (Chem 355, 356) .....	1	1	
Physics Elective (200 and above) .....	3		
Literature .....			3
American Government (Pol Sc 201) .....			3
† Social Sciences elective .....		3	
† Humanities or Social Sciences elective (other than History) .....			3
Electives .....	5	4	3
	15	15	16
Senior			
Instrumental Analysis (Chem 439) .....	4		
Senior Project (Chem 461) .....		2	
Inorganic Chemistry (Chem 481) .....		3	
Undergraduate Seminar (Chem 459) .....	2		
* Approved Chemistry elective .....	4	5	4
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Literature or Philosophy .....	3		
† Humanities elective .....			3
Electives .....	2	2	5
	15	15	15

† To be selected in accordance with the General Education requirements.

\* To be chosen from: Chem 252, 332, 341, 344, 371, 372, 373, 374, 400, 405, 419, 444, 457, 458, 462, 470, 474, 482.

## CURRICULUM FOR MASTER OF SCIENCE DEGREE IN CHEMISTRY

(For University requirements see the Graduate Studies Announcement)

Required:	<i>Units</i>
500 level Graduate courses in Chemistry .....	18
Chem 590 Graduate Seminar .....	3
Chem 599 Thesis, or additional courses if nonthesis option is chosen .....	6
Additional courses at 300, 400 or 500 level:	
Twelve units from the Chemistry Department and six units outside the Chemistry Department.....	18
	<u>45</u>

### CURRICULUM IN BIOCHEMISTRY

Freshman	F	W	S
General Chemistry (Chem 127, 128, 129) .....	4	4	4
English Composition (Engl 114) .....	4		
Oral or Written Communication .....			3
Technical Calculus (Math 131) .....	4		
Mathematics (Math 132 or CSc 101 and Stat 211).....		4	
College Physics (Phys 121, 122) .....		4	4
Life Science (Bot 121, Zoo 131, or Bact 221) .....		4	
Life Science elective .....			3
† Physical Education.....	1	1	1
Electives .....	<u>3</u>		
	16	17	15
<b>Sophomore</b>			
Quantitative Analysis (Chem 331) .....			5
Organic Chemistry (Chem 316, 317) .....	4	5	
* Chemistry elective .....			5
College Physics (Phys 123) .....	4		
Literature or Philosophy .....	3	3	
American Government (PolS 201) .....			3
† Humanities elective .....	3		
Life Science .....		3	
Chemical Literature (Chem 253) .....		1	
Electives .....	<u>2</u>	<u>3</u>	<u>3</u>
	16	15	16
<b>Junior</b>			
General Biochemistry (Chem 371, 372, 373, 374).....	4	3	3
Biochemistry Laboratory (Chem 374) .....			2
** Biophysical Chemistry (Chem 301, 302) .....	3	4	
Growth of American Democracy (Hist 204) .....	3		
U.S. in World Affairs (Hist 205) .....		3	
† Social Science electives .....		3	3
Electives .....	<u>5</u>	<u>2</u>	<u>8</u>
	15	15	16
<b>Senior</b>			
* Chemistry elective .....	3	3	3
Senior Project (Chem 461) .....		2	
Undergraduate Seminar (Chem 459) .....	2		
Electives .....	<u>10</u>	<u>10</u>	<u>12</u>
	15	15	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Chemistry and other subjects.

\* Chem 156, 252, 300 and 400 level courses (except 328).

† To be selected in accordance with the General Education requirements.

\*\* Chem 305, 306, 355 will substitute.

# COMPUTER SCIENCE AND STATISTICS DEPARTMENT

Department Head, Emile E. Attala

Jay S. Bayne  
James L. Beug  
William O. Buschman  
James C. Daly  
Jay L. Devore  
Robert H. Dourson  
Bernard B. Evans

Curtis F. Gerald  
Joseph E. Grimes  
John E. Groves  
Reino Hannula  
John Y. S. Hsu  
Elmo A. Keller  
Sham S. Luthra

Y. Leon Maksoudian  
John M. Rogers  
Robert K. Smidt  
Daniel F. Stubbs  
Neil W. Webre  
Patrick O. Wheatley  
Sing-Chou Wu

The department offers four-year programs which lead to the Bachelor of Science degree in Computer Science and to the Bachelor of Science degree in Statistics. The Master of Science degree in Computer Science is also offered. Courses in computer technology and probability and statistics, designed to fulfill the needs of the university as a whole, are also provided. Graduate-level courses are offered in computer science and statistical fields. Computer science courses offered by the department comprise those dealing with programming languages, computer organization, system software, and applications of computers. Statistics courses include probability theory, applications of statistical procedures, and the mathematical models on which the statistical methods are based.

The degree programs in computer science are designed to give professional training so that the student can make a significant contribution to the employer on graduation. Applications of the digital computer to a wide variety of situations are emphasized, and a thorough knowledge of computer systems is gained by developing facility in a variety of languages through which one communicates with computers, by study of programs which translate and compile such languages, and by "hands-on" involvement with programs which control the internal operation of computer systems. Such a broad and thorough undergraduate training is likewise good preparation for graduate study. Graduates in computer science are eagerly sought by the computer industry for positions as program analysts, systems engineers, applications programmers, and sales representatives. Access to modern computing equipment is afforded through the university's computer center, which conducts both educational and administrative applications and through minicomputer, microprocessor and graphics laboratories. In addition, students have access to both batch and interactive facilities maintained by the state university system.

The curriculum in statistics has an unusual emphasis on applications and on the use of the computer in statistical analysis of data. Students are expected to specialize in a field of application of their own choosing, and a significant number of elective courses are selected by the student to accomplish this. The statistics program prepares students for positions in industry and for graduate work in statistics. The department maintains for student use a calculating machine laboratory equipped with modern electrical and electronic calculators.

A student chapter of the Association for Computing Machinery is sponsored by the department. This active student organization supplements the department's activities in supplying vital contact with expert professional personnel from business and industry.

## CURRICULUM IN COMPUTER SCIENCE

Freshman	F	W	S
Fundamentals of Computer Science (CSc 118) .....	3		
Advanced Fortran Programming (CSc 201) .....			3
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
Modern Logic (Phil 222) .....	3		
General Chemistry (Chem 124) .....		4	

	F	W	S
<b>** Life Science elective</b> .....			3
English Composition (Engl 114) .....	4		
Logic and Switching Circuits (EL 219) .....		3	
<b>** Humanities</b> .....			3
General Physics (Phys 131, 133) .....	4	4	
Principles of Accounting (Actg 221) .....			4
* Physical Education.....			1
Electives .....		2	
	18	17	18
<b>Sophomore</b>			
Computer Principles Programming (CSc 221) .....	3		
Computer Principles and Programming (CSc 222) .....		3	
Digital Computer Architecture (CSc 304) .....			3
Linear Programming (CSc 219) .....			3
Mathematics (Math 241, 242) .....	4	4	
Statistical Analysis (Stat 321, 322) .....		3	3
* Literature .....			3
American Government (PoLS 201) .....	3		
* Physical Education.....		1	1
Electives .....	6	3	3
	16	14	16
<b>Junior</b>			
Data Structures (CSc 345) .....	3		
Programming Languages (CSc 351) .....		4	
Compilers and Interpreters (CSc 352) .....			3
Numerical Nonlinear Analysis (CSc 332) .....	3		
Principles of Economics (Econ 211, 212) .....	3	3	
American Democracy (Hist 204) .....		3	
General Psychology (Psy 202) .....			3
U.S. in World Affairs (Hist 205) .....			3
***Computer Science electives.....		3	6
Electives .....	7	4	2
	16	17	17
<b>Senior</b>			
Computer Programming Systems (CSc 452) .....	3		
Multiprogramming Systems (CSc 453) .....		3	
Report Writing (Engl 218) .....	3		
Senior Project (CSc 461, 462) .....	2	2	
Public Speaking (Sp 200) .....			3
Undergraduate Seminar (CSc 463) .....			2
***Computer Science electives.....	3	6-8	6-7
Electives .....	5	6-4	5-4
	16	17	16

- 
- \*\* To satisfy General Education natural science requirement.  
 \* To satisfy General Education requirements.  
 \*\*\* Complete two of the following sequences:  
 a) EL 305, 319, 407, and 404 or 408  
 b) CSc 319, 350, 419, and IE 430  
 c) CSc 340, 445, 446 and 2 upper division courses in Bus, Mgt, or Actg  
 d) Stat 323, 330, 423, and Bio 442  
 e) CSc 333, 431, Math 318, 319  
 f) CSc 306, 309, 404, 409.

## CURRICULUM IN STATISTICS

### Freshman

Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
Fortran Programming (CSc 101) .....	2		
English Composition (Engl 114) .....	4		
Report or Technical Writing (Engl 218 or 219) .....		3	
General Physics (Phys 131) .....		4	
General Biology (Bio 101) .....			3
* Physical Education .....	1	1	1
** Electives .....	5	4	8
	16	16	16

### Sophomore

Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Statistical Analysis (Stat 321, 322) .....		3	3
Advanced Fortran (CSc 201) .....	3		
Principles of Economics (Econ 211, 212) .....	3	3	
* Natural Sciences .....	3	3	3
Principles of Speech (Sp 200) .....			3
Genetics (Bio 303) .....			3
** Electives .....	3	3	4
	16	16	16

### Junior

Statistical Analysis (Stat 323) .....	3		
Statistical Use of Computers (Stat 330) .....		3	
Applied Regression Analysis (Stat 324) .....			3
Sampling Techniques (Stat 421) .....			3
Numerical Nonlinear Analysis (CSc 332) .....			3
Linear Programming (CSc 219) .....		3	
Linear Algebra (Math 312) .....		4	
Math Optimization or Game Theory (Math 431 or 437) .....	3		
Literature or Philosophy .....	3		3
American Government (PolS 201) .....		3	
Growth of American Democracy (Hist 204) .....			3
** Electives .....	8	4	2
	17	17	17

### Senior

Probability Theory and Applications I (Stat 425) .....	3		
Probability Theory and Applications II (Stat 426) .....		3	
Mathematical Statistics (Stat 427) .....			3
Nonparametric Methods in Statistics (Stat 415) .....	3		
Design of Experiments (Stat 423) .....		3	
Senior Project (Stat 461, 462) .....	2	2	
Undergraduate Seminar (Stat 463) .....			2

\* To be selected in accordance with the General Education requirements.

\*\* At least 15 units must be selected with the approval of the advisor in one field in which statistics is applied.

	F	W	S
Systems Analysis (CSc 350) .....	3		
U.S. in World Affairs (Hist 205) .....	3		
* Humanities .....			3
General Psychology (Psy 202) .....		3	
** Electives .....	3	6	9
	17	17	17

## CURRICULUM FOR MASTER OF SCIENCE DEGREE IN COMPUTER SCIENCE

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>	
I. Required:		
CSc 560 Practicum in Computer Science *** .....	5	
CSc 590 Seminar in Computer Science .....	3	8
II. Complete two of the following sequences:		
CSc 519, 520 Computer Modeling and Simulation .....	8	
CSc 531, 532, 533 Numerical Analysis .....	9	
CSc 541, 542 Information Processing .....	8	
CSc 551, 552 Computer Systems and Software .....	8	
Engr 520, 521, 522 Analog Computation and Simulation, Digital Systems, Computation Systems .....	10	16 to 19
III. Select, with approval of adviser, 15 units additional 300, 400, or 500 level courses related to Computer Science .....		15
IV. CSc 599 Thesis, or additional course work with comprehensive examination .....		4 to 6
Total units .....		45

\* To be selected in accordance with the General Education requirements.

\*\* At least 15 units must be selected with the approval of the adviser in one field in which statistics is applied.

\*\*\* The subject of the Practicum should be in the same area as one of the sequences.





## MATHEMATICS DEPARTMENT

Department Head, Charles J. Hanks

Sabah Al-hadad	Charles T. Haskell	Allen D. Miller
Alfred M. Bachman	Alan W. Holz	Keith R. Milliken
Bernard W. Banks	J. Myron Hood	Kent E. Morrison
Estelle L. Basor	Kempton L. Huehn	Paul F. Murphy
Herbert A. Dekleine	Rex L. Hutton	Dina N. Ng
James E. Delany	Boyd Walker Johnson	Thomas D. O'Neil
Gary M. Epstein	W. Boyd Judd	Howard Steinberg
Gerald P. Farrell	Euel W. Kennedy	Henry B. Strickmeier
Jack E. Girolo	Martin T. Lang	Raymond D. Terry
D. Edward Glassco	George C. Laumann	Neal R. Townsend
Stuart Goldenberg	George M. Lewis	John Van Eps
Harvey C. Greenwald	John J. Lowry	Ralph M. Warten
Thomas E. Hale	George W. Luna	Stephen T. Weinstein
Adelaide T. Harmon-Elliott	George R. Mach	Robert S. Wolf
Donald G. Hartig	Jean M. McDill	

The Mathematics Department offers a complete program of university work leading to a Bachelor of Science degree in mathematics with options in applied mathematics, finite mathematics, and mathematics teaching. The department also offers mathematics courses needed in all other curricula for developing vocational and professional proficiency and for general education. The occupational flavor generated by these close interdepartmental relations increases both the usefulness of and the demand for the graduates who complete one of the degrees in mathematics.

High school students planning a mathematics major should have at least three, preferably four years of high school mathematics, and two years of science.

A program of study which leads to a Master of Science degree in mathematics with specializations in mathematics teaching and in applied mathematics is offered. A graduate in the mathematics teaching specialization of this program will be qualified for community college teaching positions or, with the proper credential, for teaching positions in secondary schools. A graduate in the applied mathematics specialization will be qualified for advanced positions in industry, business, civil service, college teaching, or other scientific endeavors.

### CURRICULAR OPTIONS

#### Applied Mathematics

This option is designed for students desiring a broad exposure to those fields of mathematics which have been, and continue to be, most useful to the development of physical sciences and engineering. This option will furnish the mathematics a student should have, who seeks to enter employment in industry or government as a support mathematician for production, research, and development. In addition, this option will provide adequate mathematical foundation for that student contemplating the pursuit of an advanced degree in Mathematics.

#### Finite Mathematics

This option is designed for students in this rapidly growing branch of mathematics that has many applications in business and management sciences, resources allocation, and traffic flow. A student in computer science, industrial engineering, business, and in related fields will find many topics of interest in this option. Emphasis will be on mathematical model building and applications.

## Mathematics Teaching

The Mathematics Teaching Option is designed primarily to prepare the student for a teaching career, in junior and senior high schools. With additional courses as prescribed by the education department, the student completing this option can obtain a California single subject teaching credential in mathematics. This option also provides the student with a desirable undergraduate foundation for the master of science degree in the mathematics teaching specialization, a degree required for teaching service in community colleges and also appropriate for secondary school mathematics teachers.

### CURRICULUM IN MATHEMATICS

Freshman	F	W	S
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
Fortran Programming (CSc 101) .....	2		
** Physics (Phys 131, 132) .....		4	4
English Composition (Engl 114, 115) .....	4	4	
* Physical Education .....	2		1
Electives and courses to complete major .....	4	4	8
	16	16	17
Sophomore			
Analytic Geometry and Calculus (Math 241) .....	4		
***Computer Principles and Programming (CSc 221) .....			3
Differential Equations (Math 242) .....		4	
Methods of Proof in Mathematics (Math 248) .....		3	
Linear Algebra (Math 312) .....			4
Statistical Analysis (Stat 321) .....			3
** Physics (Phys 133) .....	4		
* Social Sciences .....		3	3
* Oral and written expression .....			3
Electives and courses to complete major .....	9	7	
	17	17	16
Junior			
Modern Algebra (Math 381) .....		4	
Statistical Analysis (Stat 322) .....	3		
* Literature or Philosophy .....	3		
* Humanities .....		3	
* Biological Sciences .....			3
* Natural Sciences (except Physics) .....	4		
* Social Sciences .....			3
American Government (Pol Sc 201) .....		3	
Growth of American Democracy (Hist 204) .....			3
Electives and courses to complete major .....	7	7	8
	17	17	17
Senior			
Undergraduate Seminar (Math 459) .....	2		
Senior Project (Math 461, 462) .....		2	2
* Literature or Philosophy .....	3		
U.S. in World Affairs (Hist 205) .....	3		
Electives and courses to complete major .....	8	14	14
	16	16	16

\* To be selected in accordance with the General Education requirements.

\*\* Teaching option majors may substitute Phys 121, 122, 123.

\*\*\* Teaching option majors may substitute CSc 414.

## APPLIED MATHEMATICS OPTION

(Add Courses Below to Mathematics Curriculum)

Junior and Senior Years

Math 304 Vector Analysis .....	(4)	CSc 332, 333 Numerical Analysis.....	(6)
Math 318 Advanced Engineering Mathematics .....	(4)	Math 336 Combinatorial Mathematics	(3)
Math 319 Partial Differential Equations .....	(3)	Math 408 Complex Variables.....	(4)
		Math 412 Advanced Calculus .....	(3)
		Math 413 Advanced Calculus .....	(3)

## FINITE MATHEMATICS OPTION

(Add Courses Below to Mathematics Curriculum)

Junior and Senior Years

Math 318 Advanced Engineering Mathematics .....	(4)	Math 437 Game Theory .....	(3)
Math 335 Graph Theory .....	(3)	CSc 219 Linear Programming.....	(3)
Math 336 Combinatorial Mathematics	(3)	CSc 319 Computer Simulation .....	(3)
Math 431-2 Mathematical Optimization .....	(6)	CSc 350 Systems Analysis .....	(3)
		CSc 419 Mathematical Programming..	(3)

## MATHEMATICS TEACHING OPTION

(Add Courses Below to Mathematics Curriculum)

Junior and Senior Years

Math 105 Hand-held Calculators .....	(1)	Math 424 Organizing and Teaching Mathematics .....	(3)
Math 341 Theory of Numbers .....	(4)	Math 442 College Geometry .....	(3)
Math 382 Modern Algebra .....	(4)	Math 443 Non-Euclidian Geometry....	(3)
Math 412 Advanced Calculus .....	(3)	Math 444 Projective Geometry .....	(3)
Math 419 Introduction to History of Mathematics .....	(3)	CSc 410 Computer Fundamentals for Educators .....	(3)

## CURRICULUM FOR THE MASTER OF SCIENCE DEGREE IN MATHEMATICS With Specializations in Mathematics Teaching and in Applied Mathematics

(For University requirements see the *Graduate Studies Announcement*)

	<i>Units</i>
I. Required Math 506, 508, 515 .....	9
* II. 15 units of 500 level courses selected according to specialization.....	15
III. Select 12 units from any 300, 400, 500 courses having the prefixes, Math, CSc, Stat, approved by the advising committee .....	12
** IV. Elect 9 additional units with approval of adviser.....	9
V. Satisfactorily complete a terminal written and oral examination; or complete Math 596, Graduate Thesis, for 6 units of credit under III.....	—
	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Computer Science, Mathematics, Statistics, and other subjects.

\* For specialization in Mathematics Teaching: Math 580 and 519, Math 510 or 511 and 6 additional units selected from Math 505, 507, 510, 511, 580. For specialization in Applied Mathematics: 6 units of Math 580 and 9 additional units selected from: Math 512, 513, 516, 518, 580, CSc 531.

\*\* For specialization in Applied Mathematics, these units to be selected in one area other than mathematics, statistics, and computer science (physics, engineering, economics, chemistry, etc.) Exceptions may be made for candidates with an approved Bachelor's or higher degree in a field other than mathematics, computer science or statistics.

# MILITARY SCIENCE DEPARTMENT

Department Head (Acting), Lt. Colonel Willis L. Manley

Major John Trahey

Major William R. Lipke

Captain Bobby T. Lum Ho

## PURPOSE

The Military Science Department conducts a program of instruction which develops the mental and physical qualifications of graduates in preparation for positions of leadership within the military and/or civilian communities. Both men and women students may enroll for full academic elective credit without incurring any military service obligation. Courses complement all major areas of study by broadening the student's basic education. The curriculum includes both military leadership and management courses, and courses which provide an awareness of the heritage of the U.S. Military; the Army's role in national defense and world affairs; motivational techniques and the psychology of group dynamics. Students desiring to attain a commission as a Second Lieutenant in the U.S. Army upon graduation pursue the entire Military Science/ROTC (Reserve Office Training Corps) program. To be eligible for participation in ROTC, a student must be a regularly enrolled student at this university, have sufficient time remaining as a university student to permit completion of the advanced course (third and fourth academic years) prior to reaching the 28th birthday, and be physically qualified. Medical acceptability for the basic course (first and second academic years) requires a statement from the student's physician that the individual is medically fit to participate in the ROTC program, a program not more strenuous than a college physical education program. ROTC scholarships are available which provide full tuition, books, supplies, and an allowance of \$100 per month for the duration of the scholarship. Nonscholarship ROTC cadets also receive an allowance of \$100 per month while enrolled in the advanced course.

## EQUIPMENT AND UNIFORMS

All necessary equipment, uniforms and text books for participation in the Military Science/ROTC program are furnished to the student by the United States Government free of charge. Title to this property, other than expendable items, remains with the government. Students entering into active commissioned service after graduation are granted a special \$300 uniform allowance.

## FOUR-YEAR PROGRAM

The four-year elective ROTC program is a progressive course of instruction divided into a two-year basic course and a two-year advanced course.

Students with previous military service, or with Junior ROTC credit or ROTC credit from another institution, may be granted advanced standing in the course. Students who will complete degree requirements in three academic years may enroll in first-year and second-year ROTC courses concurrently and complete the four-year program in three years.

During the third and fourth academic years students are permitted to apply credit for Military Science related academic courses toward ROTC program requirements. These academic courses must be in a field outside the student's major academic discipline, and account for six quarter units during the two-year period.

Students who elect to enter the advanced course of ROTC instruction are paid \$100 per month while enrolled. The only obligation connected with the receipt of this subsistence allowance is the willingness by the student to accept a reserve commission of Second Lieutenant if it is offered upon graduation and to serve a period of three years on active duty as a commissioned officer, if called.

Four-year program students are required to attend summer training camp for a six-week period following completion of their third year. The government furnishes all uniforms, equipment, room, board, and medical care for students at camp. Additionally, each student is paid at the rate of one half a Second Lieutenant's pay and is provided a transportation allowance from and to home. No university credit is accrued for the advanced summer camp.

## TWO-YEAR PROGRAM

The opportunity offered by ROTC training is available in a special program to transfer students and to currently enrolled college students who were unable to participate in the four-year ROTC program.

To qualify for the two-year program, the student must complete a special basic ROTC summer camp of six weeks' duration. Students normally attend basic camp between their second and third academic years. Transfer students must complete the camp during the summer immediately prior to their matriculation at this university. It is important that potential transfer students who plan to participate in the two-year ROTC program make their intentions known directly to the Head, Military Science Department, no later than 1 March of the year they plan to register at the university even though this date may precede the date of their final acceptance by the university.

The government will provide transportation allowance to and from basic summer camp, and the rate of pay as an Army Private. All equipment, uniforms, room, board and medical care are furnished free while at camp. The basic summer camp is in addition to the advanced summer camp which must be taken at the end of the third academic year as part of the advanced course. No university credit is accrued for the basic summer camp and no military obligation is incurred as a result of attendance.

Upon successful completion of the basic summer camp, the student is admitted directly into the advanced ROTC course in September during registration at the university. The student is entitled then to the advanced course subsistence allowance and all other privileges of advanced course standing as enumerated above under the four-year program.

Students who are unable to attend the basic camp may still qualify for the advanced course by participating in a series of courses offered during the summer quarter. This program, termed the Mini-Course, is a combination of academic courses and practical application designed to bring a participating student to the same level as those who attend either the first two years of the four-year program or the basic camp. Students satisfactorily completing the Mini-Course earn 6 units of academic credit and may be admitted directly into the advanced ROTC course in September during registration at the university.



## **MODULAR PROGRAM**

Basic course students are offered an alternative to the courses of instruction for which academic elective credit is given. The modular program may be substituted for the four-year program basic course, and is based on practical application through activity participation rather than the academic curriculum. A variety of skill and adventure modules, for which no elective credit units accrue, are offered and may be pursued solely or in combination with the academic curriculum to qualify for entry directly into the advanced ROTC course. Cadets so qualifying for the advanced course receive the subsistence allowance and all other privileges of advanced course standing as enumerated above under the four-year program. Students desiring to participate in the modular program do so by contacting the enrollment officer of the Military Science Department.

## **RESERVE COMPONENT DUTY**

Students who elect or are selected for Reserve Component duty, i.e., U.S. Army Reserve Forces or the National Guard, may be commissioned immediately upon completion of the advanced course and prior to graduation from the university. Commissioning is contingent upon the student being accepted into a Reserve or National Guard unit. A student thus commissioned is entitled to receive the pay of a Second Lieutenant during drill periods (approximately one weekend per month and two weeks during the summer). After graduation an individual serving in the Reserve Components will be called to active duty for a period not to exceed 180 days.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Military Science and other subjects.

## PHYSICS DEPARTMENT

Department Head, Robert H. Frost

Lawrence H. Balthaser  
Ronald F. Brown  
Joseph C. Boone  
Athol J. D. Brunk  
Anthony J. Buffa  
Arthur S. Cary  
David H. Chipping  
Clyde G. Dease  
Robert H. Dickerson  
Walt Elliott

Theodore C. Foster  
Teymoor Gedayloo  
David W. Hafemeister  
Kenneth A. Hoffman  
Herbert R. Kabat  
James S. Kalathil  
Leon W. Magur  
John Mottmann  
Kenneth S. Ozawa  
Ralph A. Peters

John E. Poling  
David M. Roach  
Arthur Z. Rosen  
Thomas G. Schumann  
Gordon A. Silver  
Keith S. Stowe  
Willem L. van Wyngaarden  
Leonard W. Wall  
Walter D. Wilson

The Physics Department serves all schools of the University by offering courses which provide the scientific foundations for work taken by students in their major fields. The department also contributes to the general education of all students by increasing their understanding of the process of scientific discovery, of the nature of the physical universe, and of the potential impact of science on society. The department offers curricula in physics and in physical sciences leading to the bachelor of science degree.

The department's goal in training physics majors is to prepare them for entry into positions as physicists, to prepare them for further training as physics teachers, especially at the community college or more advanced levels, or to give them a strong foundation in science that will enable them to enter other related professions. The program prepares students for possible further formal education in graduate school. Graduates are engaged in many fields and industries, including computers, electronics, aerospace, energy production and utilization, and the development of material resources and products. To prepare physics majors effectively for employment, the department provides a comprehensive laboratory program, with facilities which include specialized laboratories in electrical measurements, optics, solid state physics, nuclear physics, and reactor physics, including a subcritical nuclear reactor assembly. Student activities include a chapter of the national Society of Physics Students and a chapter of the national physics honor society, Sigma Pi Sigma.

It is suggested that the high school student planning to major in physics include in his or her high school program as much as possible of the following: six semesters of college preparatory mathematics, two of physics and two of chemistry.

The Bachelor of Science in Physical Science is a degree major designed primarily to provide undergraduate preparation for the student who intends to be a secondary school teacher of one or more of the physical sciences. It may also serve students who plan to enter another field in which a physical science background would be useful, but students intending to do graduate study in either chemistry or physics should elect a chemistry or physics major. Students planning to qualify for a teaching credential in physical science should plan their electives to include the education courses indicated. The Physical Science degree program is administered jointly by the Chemistry and Physics Departments.

## CURRICULUM IN PHYSICS

Freshman	F	W	S
Biological Sciences (Bio 101, Bot 121, or Zoo 131) .....	3		
† Written communication (Engl 104, 105, 218 or 114, 115) .....	3	3	3
* Physical Education.....	1	1	1
Analytic Geometry and Calculus (Math 141, 142, 143) .....	4	4	4
General Chemistry (Chem 127, 128).....	4	4	
Survey of Organic Chemistry (Chem 226) .....			4
General Physics (Phys 131, 132) .....		4	4
Introduction to Physics (Phys 100).....	1		
	16	16	16
Sophomore			
Economics (Econ 201 or 211) .....			3
Analytic Geometry and Calculus (Math 241) .....	4		
Differential Equations (Math 242) .....		4	
Fortran Programming (CSc 101) .....	2		
Advanced Engineering Math (Math 318) .....			4
General Physics (Phys 133, 134) .....	4	3	
Modern Physics (Phys 211) .....		4	
Instruction to Nuclear Physics (Phys 213) .....			3
Introductory Nuclear Physics Laboratory (Phys 243) .....			1
Instrumentation in Experimental Physics (Phys 206, 207) .....		2	2
Electrical Measurements Laboratory (Phys 256, 257) .....		1	1
* Humanities .....	3		
Electives .....	3	2	2
	16	16	16
Junior			
* Literature .....			3
* Literature or philosophy .....		3	
Partial Differential Equations (Math 319).....	3		
Vector Analysis (Math 304) .....		4	
Heat (Phys 301) .....	3		
Analytic Mechanics (Phys 302, 303) .....	3	3	
Solid State Physics (Phys 406) .....		3	
Solid State Physics Laboratory (Phys 456) .....			1
Quantum Mechanics (Phys 405) .....	3		
Quantum Physics Laboratory (Phys 341, 342) .....	1	2	
Physical Optics (Phys 323) .....			4
Undergraduate Seminar (Phys 363) .....			2
Electives .....	3	2	6
	16	17	16
Senior			
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
* Social Sciences .....	3		
Electricity and Magnetism (Phys 408, 409) .....	4	3	
Senior Project (Phys 461, 462) .....	2	2	
Approved Physics electives .....	3	3	3
Electives .....		5	10
	15	16	16

† If requirement is satisfied with 114, 115, an additional unit of general education must be taken.

\* To be selected in accordance with the General Education requirements.



## CURRICULUM IN PHYSICAL SCIENCE

Freshman	F	W	S
General Chemistry (Chem 127, 128, 129) .....	4	4	4
* Physics (Phys 131, 132 or 121, 122) .....		4	4
Analytic Geometry and Calculus (Math 141,2,3 or 131,2,3) .....	4	4	4
English Composition (Engl 114) .....	4		
† Literature .....	3		
† Literature or Philosophy .....		3	
† Humanities elective .....			3
	15	15	15
Sophomore			
* Chemistry (Chem 226 or 316 and 328 or 371) .....	4		4
* Physics (Phys 133 or 123 and 211 or 210) .....	4	4	
** Approved Physics elective .....		3	
Mathematics, Computer Science, or Statistics electives .....		4	4
Fortran Programming (CSc 101) .....	2		
Physical Geology (Geol 201) .....			3
American Government (Pol Sc 201) .....	3		
Principles of Speech (Sp 200) .....	3		
Growth of American Democracy (Hist 204) .....		3	
U.S. in World Affairs (Hist 205) .....			3
Drug Education (PE 305) .....			2
† Physical Education .....		1	
	16	15	16
Junior			
Chemistry (Chem 301 or 305) .....	3		
Astronomy (Astr 301 or 302) .....	3		
† Biological Sciences electives .....	4	4	4
** Approved Chemistry elective .....		4	
** Approved Astronomy and/or Earth Sciences electives .....			4
** Approved Physical Science 300 or 400 level electives .....		3	3
Advanced Composition (Engl 300) .....	3		
† Social Science elective .....	3		
Electives toward credential requirements:			
Learning Process (Ed 335) .....		3	
Reading Methods (Ed 434) .....		2	
Instructional Processes (Ed 438) .....			3
Multicultural Education (Ed 301) .....			3
	16	16	17

\* A choice of the Phys 121–2–3 sequence or Chem 226 or 328 restricts the Physics and Chemistry electives available to the student later in this program.

† To be selected in accordance with the General Education requirements.

\*\* Chosen with approval of adviser.

Senior	F	W	S
Senior Project (Chem, Phys, or PSc 461) .....	2		
** Approved Physical Sciences 300- or 400-level elective (Prospective teachers take Org and Tchg Phys Sci (PSc 424) .....	3		
Approved Physics 300- or 400-level elective .....			3
† Social Science elective.....			3
Elective.....	2	3	6
Electives toward credential requirements:			
Diagnosis, Prescription, and Evaluation (Ed 436) .....	2		
Student Teaching (Ed 430, 440) .....	6	12	
Methods of Teaching Reading (Ed 435) .....			3
	<u>15</u>	<u>15</u>	<u>15</u>

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Physics and Physical Science and other subjects.

† To be selected in accordance with the General Education requirements.

\*\* Chosen with approval of adviser.

# Division of Social Sciences



## DIVISION OF SOCIAL SCIENCES

Warren W. DeLey, Associate Dean

The Division of Social Sciences has two primary objectives. The first is education leading to the degrees of Bachelor of Arts in Political Science or Bachelor of Science in Social Sciences. A second is service to students throughout the University, providing courses which satisfy general education requirements and elective options in support of major degree work.

The Division is organized into the Political Science Department and the Social Sciences Department (which offers courses in anthropology, geography, social science, and sociology). Faculty members within the Division are selected on the basis of academic qualifications and professional experience, as well as outstanding teaching ability.

Students in the Division prepare for a wide range of careers in various areas of the public and private sector. In addition, many enter graduate schools to pursue further specialized studies. A pre-law advisement service is available to all University students.

A variety of occupational concentrations is available within each of the two major programs. Students are also given the option of choosing among certain concentrations in several disciplines outside the Division.



# POLITICAL SCIENCE DEPARTMENT

Department Head, Earl D. Huff

William M. Alexander  
George G. Clucas  
Randal L. Cruikshanks  
John H. Culver

David L. George  
Reginald H. Gooden, Jr.  
Richard B. Kranzdorf  
Carl E. Lutrin

Carroll R. McKibbin  
Allen K. Settle  
John C. Syer  
Joseph N. Weatherby

The Political Science Department offers undergraduate instruction leading to the degree of Bachelor of Arts in Political Science. With a concern for theoretical principles as well as practical application, the degree requirements include both a common body of material and the completion of a curricular concentration or an individualized course of study in Political Science as listed below. Such curricular alternatives focus the training within the degree program toward career opportunities in government and other public agencies and in the legal profession.

In addition to the offerings available for those who wish to major in Political Science, the Department provides students in all curricula within the University with an understanding of the operations of local, state, and national government and the processes by which the individual and community interact in the several levels of government.

Through the required and elective courses, the Department seeks to expand each student's comprehension of the political process, to develop those skills and attitudes which are essential for effective citizenship, and to prepare each Cal Poly graduate for intelligent and responsible political behavior.

## CURRICULAR CONCENTRATIONS

### International Affairs

This concentration is designed to prepare students for careers in government and related agencies which deal in the many problems in international affairs and to prepare students to enter graduate studies in the field of international relations.

### Pre-Law

This concentration is designed to prepare students for careers in the several fields of law. Some students who complete this concentration may seek admission to accredited law schools to continue their preparation for the law profession. Others may seek careers in law-related professions such as law enforcement, probation, corrections and legal assistance.

### Public Administration

This concentration is designed to prepare students for careers in administrative work in government and related agencies and to prepare students to enter graduate studies in the field of administration.

### Teaching

This concentration is designed to prepare students for careers as elementary school teachers and for careers as social studies teachers in junior high schools and high schools.

### Urban Studies

This concentration is designed to prepare students for careers in broad fields of planning within government and related agencies and to prepare students to enter advanced studies in the field of city and regional planning.

## INDIVIDUALIZED COURSE OF STUDY

This program is designed to provide career identity for students who do not select any of the above concentrations and to permit students with varying backgrounds and interests to pursue a course of study which meets their individual needs and interests. It consists of 27 units of course work at the 300-400 level selected by the student and recommended by the student's academic adviser.

Concentrations in Community Studies, Criminal Justice, Cross-Cultural Studies, and Social Services are currently offered by the Social Sciences Department and may be taken by Political Science majors. In addition, the following concentrations from the School of Business may be

taken: Accounting, Industrial Relations, International Trade and Development, Management, and Management Information Systems.

CURRICULUM IN POLITICAL SCIENCE

Freshman	F	W	S
English Composition (Engl 114, 115) .....	4	4	
Introduction to Political Science (Pol Sc 100) .....	3		
National and California Government (Pol Sc 101, 102) .....	3	3	
Introduction to International Relations (Pol Sc 105) .....			3
Introduction to Sociology (Soc 105) .....	3		
History of Western Civilization (Hist 102, 103) .....		3	3
U.S. in World Affairs (Hist 205) .....			3
Elementary Probability and Statistics (Stat 211) .....		3	
Principles of Speech (Sp 200) .....			3
Health Education (PE 250) .....			2
Physical Education activity .....	1		
* Electives and courses to complete concentration .....	<u>1</u>	<u>2</u>	<u>1</u>
	15	15	15
Sophomore			
Cultural Anthropology (Ant 201) .....	3		
Principles of Economics (Econ 211, 212) .....		3	3
General Psychology (Psy 201 or 202) .....	3		
Comparative Politics (PolSc 202) .....	3		
Introduction to Public Administration (PolSc 214) .....	3		
Basic Political Analysis (PolSc 203) .....		5	
Basic Concepts of Political Thought (PolSc 204) .....			3
Judicial Process (PolSc 206) .....			3
United States History (Hist 202, 203) .....		3	3
Natural Science electives .....	3	3	3
* Electives and courses to complete concentration .....	<u>1</u>	<u>2</u>	<u>1</u>
	16	16	16
Junior			
Political Science at 300-400 level .....	6	6	6
Political Geography (Geog 305) .....		3	
Humanities elective .....			3
* Electives and courses to complete concentration .....	<u>10</u>	<u>7</u>	<u>7</u>
	16	16	16
Senior			
Senior Project (Pol Sc 461, 462) .....	2	2	
Political Science at 300-400 level .....	3	3	3
Biological Science elective .....	3		
Literature elective .....			3
Philosophy elective .....			3
Physical Science elective .....		3	
* Electives and courses to complete concentration .....	<u>7</u>	<u>7</u>	<u>6</u>
	15	15	15

See COURSES OF INSTRUCTION section of this catalog for description of courses in Political Science and other subjects.

\* 27 elective units at the 300-400 level must be chosen with the approval of the adviser in the field of concentration. Concentration lists available at the department office.

# SOCIAL SCIENCES DEPARTMENT

Department Head, Robert L. Hoover

James W. Coleman  
Barbara E. Cook  
Warren W. DeLey  
Donald R. Floyd  
Anne C. Fowler

Mahmud S. Hariri  
Harold R. Kerbo  
Patrick C. McKim  
John A. McKinstry  
Michael J. O'Leary

Leo W. Pinard II  
Richard A. Shaffer  
George J. Suchand  
Calvin H. Wilvert

The Social Sciences Department provides a broadly-based orientation to the study of society. Students prepare for a wide range of careers in federal, state and local government; teaching; social services agencies; and criminal justice including probation, parole and law enforcement; as well as in business and industry. The flexible curriculum of the Department offers the student of the 1980's the opportunity for familiarization and analysis concerning the most sensitive and critical issues of the student's life.

The Social Sciences Department serves all of the schools of the campus in providing general education for citizenship. In general, the department seeks to provide the student with a better understanding of the society in which we live, to develop in the student those skills and attitudes which are prerequisites for effective citizenship, and to prepare and encourage the individual toward intelligent and responsible social action.

The occupational objectives of the department are to train students for those numerous entry jobs in civil service, business, industry, and social welfare which require a bachelor's degree with a major in the social sciences, and to train those who expect to teach the social studies in elementary or secondary schools.

Students with majors in fields other than the social sciences may select courses which will aid in qualifying them for a variety of civil service positions.

The department offers the degree of Bachelor of Science in Social Sciences. This degree allows the student to choose among five concentrations leading to different careers. The department also offers graduate courses which permit the student to qualify for a Master of Arts Degree in Education with a concentration in the field of Social Sciences.

## CURRICULAR CONCENTRATIONS

### Community Studies

This concentration prepares students to apply social research methods to community problems. Currently evaluative research of many government programs and nonprofit organizations is being required to justify continued funding. In most cases, traditional economic cost benefit analysis techniques fail to conceptualize problems and separate the data for analysis. Students taking this concentration will learn both quantitative and qualitative techniques for assessment of program impacts.

### Criminal Justice

This concentration is designed to prepare students for careers in law enforcement, corrections, detention, probation, parole and other criminal justice agencies.

### Cross-Cultural Studies

This concentration will prepare students for careers in a wide range of cross-cultural contexts: international development agencies, the public health field, intercultural education, plus numerous careers overseas in private industries.

### Social Sciences (Teaching)

With proper selection of electives, this concentration leads to preparation for elementary or secondary teaching on completion of the fifth year. It also provides the student with a broad background for entry positions in business.

### Social Services

By providing instruction in the social services area, this concentration prepares students to enter such fields as social work, corrections, probation, or parole.

Concentrations outside the Social Sciences Department also are offered as follows: Administration, Pre-Law, International Affairs or Urban Studies (Political Science Department); Industrial Relations, Management, or International Trade and Development (School of Business).

## CURRICULUM IN SOCIAL SCIENCES

Freshman	F	W	S
English Composition (Engl 114, 115) .....	4	4	
National and California Government (Pol Sc 101, 102) .....	3	3	
Introduction to International Relations (Pol Sc 105) .....			3
United States History (Hist 201, 203) .....		3	3
Human Geography (Geog 150) .....	4		
Physical Education activity .....		1	
Health Education (PE 250) .....			2
Mathematical Sciences elective .....			3
* Electives and courses to complete major .....	5	6	5
	16	17	16
Sophomore			
Principles of Sociology (Soc 201, 202, 203) .....	3	3	3
Cultural Anthropology (Ant 201) .....	3		
World Prehistory (Ant 202) .....		3	
U.S. in World Affairs (Hist 205) .....	3		
Principles of Speech (Sp 200) .....			3
General Psychology (Psy 202) .....		3	
Biological Sciences electives .....	3	3	3
Philosophy elective .....			3
* Electives and courses to complete major .....	5	5	4
	17	17	16
Junior			
Economics .....	3	3	
Physical Anthropology (Ant 203) .....			3
Physical Geography (Geog 250) .....		4	
Comparative Government (Pol Sc 202) .....	3		
Political Science at 300-400 level .....	3		
History at 300-400 level .....	3	3	
Geography at 300-400 level .....			6
Physical Sciences elective .....		3	
Natural Sciences elective .....			3
* Electives and courses to complete major .....	5	4	5
	17	17	17
Senior			
Senior Project (Soc Sc 461, 462) .....	2	2	
Undergraduate Seminar (Soc Sc 463) .....	2		
Anthropology at 300-400 level .....		3	3
Sociology at 300-400 level .....	3	3	3
Humanities elective .....	3		
Literature elective .....			3
* Electives and courses to complete major .....	6	8	7
	16	16	16

See COURSES OF INSTRUCTION sections of this catalog for descriptions of courses in Anthropology, Geography, Social Sciences, Sociology and other subjects.

\* 27 of the elective units must be chosen with the approval of the adviser in a field of concentration.



## Courses of Instruction



# SCHOOLS, DEPARTMENTS AND COURSE PREFIXES

## SCHOOL OF AGRICULTURE AND

NATURAL RESOURCES.....	Ag
Agricultural Education .....	Ag Ed
Agricultural Engineering .....	AE
Agricultural Management .....	AM
Animal Science .....	A Sci
Crop Science .....	CrSc, FrSc, VgSc
Dairy Science .....	DH, DM
Food Industry .....	FdSc
Natural Resources Management .....	NRM
Ornamental Horticulture .....	OH
Poultry Industry .....	PI
Soil Science.....	SS
Veterinary Science .....	VS

## SCHOOL OF ARCHITECTURE AND

ENVIRONMENTAL DESIGN .....	EDes
Architectural Engineering .....	ArcE
Architecture .....	Arch
City and Regional Planning .....	CRP
Construction.....	Cstr
Landscape Architecture.....	LA

## SCHOOL OF BUSINESS..... GSB

Accounting .....	Actg
Business Administration .....	Bus, FPM, Mktg
Economics.....	Econ
Management .....	Mgt

## SCHOOL OF COMMUNICATIVE ARTS

AND HUMANITIES .....	Hum
Art .....	Art
English.....	Engl
Foreign Languages .....	ForL, Fr, Ger, Span
Graphic Communications .....	GrC
History .....	Hist
Journalism.....	Jour
Music .....	Mu
Philosophy .....	Phil
Speech Communication .....	Sp, Th

## SCHOOL OF ENGINEERING AND TECHNOLOGY .....

Engr	
Aeronautical Engineering .....	Aero
Civil Engineering .....	CE
Electronic and Electrical Engineering .....	EE, EL
Engineering Technology.....	ET, ETAC, ETEL, ETME, ETMP, ETWT
Environmental Engineering .....	EnvE
Industrial Engineering.....	IE
Industrial Technology .....	IT
Mechanical Engineering .....	ME, MfgE
Metallurgical Engineering .....	Met

## SCHOOL OF HUMAN DEVELOPMENT AND EDUCATION

Child Development.....	CD
Education .....	Ed, Eth S
Home Economics .....	HE

Physical Education .....	PE, PEM, PEW, Rec
Psychology .....	Psy

#### SCHOOL OF SCIENCE AND MATHEMATICS

Biological Sciences .....	Bact, Bio, Bot, Cons, Ent, Zoo
Chemistry .....	Chem
Computer Science and Statistics .....	CSc, Stat
Mathematics .....	Math
Military Science.....	MSc
Physics.....	Astr, Geol, Phys, PSc

#### DIVISION OF SOCIAL SCIENCES

Political Science.....	Pol Sc
Social Sciences.....	Ant, Geog, Soc, Soc Sc

UNIVERSITY LIBRARY .....	Lib
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## COURSE DESCRIPTIONS

Courses are listed alphabetically by prefix. Descriptions of experimental courses (designated by X following the course number) will be found in the quarterly class schedule, which is sold in El Corral University Store.

#### Course Numbering System

The numbering system used is a three-digit system. Courses are generally numbered according to the plan shown below.

010-099 Nondegree credit or short courses.	ates and graduate students.
100-299 Courses taught primarily in the freshman and sophomore years.	500-599 Graduate courses.
300-399 Courses primarily for advanced undergraduate students, generally bearing no graduate degree credit.	600-699 Courses for professional advancement within a special field and do not carry credit for degree requirements in any of the curricula.
400-499 Courses for advanced undergradu-	

#### Prerequisites

Prerequisites indicate recommended preparation. Course prerequisites cited in this catalog are intended to inform the student of any previous work needed for the course. Eligibility of students who do not meet the stated prerequisites is determined by their academic advisers and the appropriate instructor.

## ACCOUNTING

#### Actg 131, 132 Basic Accounting (3) (3)

A study of accounting to show how records are kept, their uses and limitations. For the student who needs a general knowledge of accounting. Not applicable for credit toward major in business administration. Sequence courses. 3 lectures.

#### Actg 221, 222 Principles of Accounting (4) (4)

Principles and practices of fundamental accounting theory. Sequence courses. 4 lectures.

#### Actg 301 Managerial Accounting (4)

Relationship of accounting to business operations and analysis. Analysis and application of accounting principles and procedures to business organizations. 4 lectures. Prerequisite: Actg 222.

**Actg 304 Tax Accounting (4)**

Federal and state income taxation of individuals. 4 lectures. Prerequisite: Actg 131 or 221.

**Actg 305 Tax Accounting (4)**

Federal and state income taxation of corporations, partnerships, estates and trusts. Federal and state gift and death taxes. 4 lectures. Prerequisite: Actg 132 or 222 and 304.

**Actg 321, 322 Intermediate Accounting (4) (4)**

Conventional financial accounting: theory, problems and contemporary issues. Sequence courses. 4 lectures. Prerequisite: Actg 222.

**Actg 323 Advanced Accounting (4)**

Accounting theory and practice relating to partnerships, special sales procedures, multinational business operations, and business insolvencies. 4 lectures. Prerequisite: Actg 322.

**Actg 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

**Actg 402 Advanced Cost Accounting (4)**

Process and standard costs; overhead costs, budgeting. Use of cost accounting data in economic analyses and managerial control. 4 lectures. Prerequisite: Actg 301.

**Actg 403 Governmental Accounting (4)**

Accounting for governmental and non-profit organizations. Use of accounting information to control and achieve objectives of the programs involved. 4 lectures. Prerequisite: Actg 222.

**Actg 417 Controllership (4)**

Function, organization, and responsibilities of the controllership in the business environment. Integration of the accounting function into the corporate organization; role and relationships of the controllership in the corporation. 4 lectures. Prerequisite: Actg 322, senior standing.

**Actg 421 Business Combinations (4)**

Authoritative accounting methods and their applications for business combinations including mergers and consolidations. Consideration of related problems and financial reporting requirements. 4 lectures. Prerequisite: Actg 323 and Bus 207 or consent of instructor.

**Actg 430 Internship (4-8)**

Placement as an employee in a business firm approved by the department head. Periodic written progress reports required. Collateral reading correlated with the work experience. Credit/No Credit grading. Prerequisite: Approval of department head.

**Actg 431 Professional Accounting (4)**

Development of the accounting profession. Past, present and future. Emphasis on contemporary issues confronting the professional accountant and his social and ethical responsibilities and opportunities. 4 lectures. Prerequisite: Actg 323 or consent of instructor.

**Actg 446 Auditing (4)**

Professional auditing: theory, philosophy and problems. 4 lectures. Prerequisite: Actg 323 or consent of instructor. Mgt 321 is recommended.

**Actg 460 Senior Project (2)**

Selection and completion under faculty supervision of a project typical of problems graduates must solve in their field of employment. Required minimum of 60 hours. Formal report required. Prerequisite: Bus 419.

#### **Actg 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

#### **Actg 500 Individual Study (1-3)**

Advanced study planned and completed under direction of departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head.

## **AERONAUTICAL ENGINEERING**

#### **Aero 102 Introduction to General Aviation (3)**

Fundamentals of aerodynamics and principles of flight. Introduction to power systems and instrumentation used by general aviation aircraft. Principles of air navigation. Interpretation of weather data, uses of flight computer, applicable Federal Aviation Regulations, subjects covered in the private pilot's examination. Not acceptable as a technical elective for engineering students. Not open for technical credit to Aeronautical Engineering students. 3 lectures.

#### **Aero 121, 122, 123 Aerospace Fundamentals (2) (2) (2)**

Introduction to the engineering profession including the aeronautical and aerospace fields. Engineering approach to problem-solving and analysis of data obtained from experiments. Basic nomenclature and design criteria used in the aerospace industry. Applications to basic problems in the field. 2 laboratories.

#### **Aero 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

#### **Aero 201 Introduction to Applied Aerodynamics (3)**

Introduction to Applied Aerodynamics. Primary emphasis on aircraft, missile and satellite performance, and basic aerodynamics. Subjects covered: atmosphere, wing theory, drag, airfoil theory, static flight performance, and dynamic flight performance. 3 lectures. Prerequisite: Math 142.

#### **Aero 203 Aero Laboratory (2)**

Aero instrumentation for use with wind tunnels and aeroballistic ranges such as strain gauges, force balance system, pitot tubes, monometers, hot wire anemometer, dynamic supports, etc. Reduction facilities, techniques, and electronic instrumentation will be covered. 1 lecture, 1 laboratory.

#### **Aero 205 Energy Science, R & D (3)**

Scientific, engineering and technological fundamentals for the utilization of alternate energy resources for propulsion, power, heat, etc., and R & D (Research and Development) in this area. 3 lectures. Prerequisite: Chem 124 and Phys 133.

#### **Aero 240 Additional Engineering Laboratory (1-2)**

Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories.

#### **Aero 301, 302, 303 Aerothermodynamics (4) (4) (3)**

Properties and characteristics of fluids, fluid statics and dynamics, the thermodynamic relations, laminar and turbulent subsonic flows as applied to flight vehicles. Introduction to heat transfer. 4 lectures, fall and winter; 3 lectures, spring. Prerequisite: ME 211, Math 242.

#### **Aero 304 Aerothermodynamics Laboratory (2)**

Laboratory experiments verify the momentum and energy equations; fan performance, boundary layer measurements, diffuser performance, heat transfer and solar collector performance experiments are evaluated. 2 laboratories. Prerequisite: Aero 301.

**Aero 306 Aerodynamics (3)**

Introduction to theoretical aerodynamics. Primary emphasis in the subsonic region. Basic aerodynamic theory: Airfoil theory, wing theory, lift and drag. Performance analysis. 3 lectures. Concurrent: Aero 303.

**Aero 307 Wind Tunnel and Flight Test Laboratory (2)**

Course includes wind tunnel testing techniques such as measurement of lift, drag, pressure distribution, and dynamic response of vehicles. Test techniques and data reduction of flight systems. 1 lecture, 1 laboratory.

**Aero 324 Stress Analysis (4)**

Truss analysis; torsion of space frames and box beams. Shear and bending of straight and curved beams. Moment and product of inertia; Mohr's circle. Normal and shear stresses for beam bending about non-principal axes; the shear center. Beam columns under various loading and support conditions. Laboratory projects dealing with aerospace structures. 3 lectures, 1 laboratory. Prerequisite: Math 242, CE 208, 209.

**Aero 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**Aero 401 Propulsion Systems (4)**

Power plant types, components, characteristics, and requirements. Principles of thrust and energy utilization. Thermodynamic processes and performance of turboprop, turboshaft, turbopfan, turbojet, ramjet, and rocket engines. 401: 3 lectures, 1 laboratory. Prerequisite: Aero 404.

**Aero 404 Gas Dynamics (4)**

Fundamental theory of one dimensional gas dynamics: Isentropic flow, flow in converging-diverging nozzles, shock propagation, normal and oblique shock theory, Prandtl-Meyer expansions, Fanno line flow, and measurement methods. 4 lectures. Prerequisite: Aero 303.

**Aero 406 Introduction to Boundary-Layer Theory (3)**

Concept of the boundary-layer. Boundary-layer equations, the similarity concept, fundamental similarity solutions, the thermal boundary-layer. 3 lectures. Prerequisite: Aero 303 or equivalent.

**Aero 407 Aerospace Science (3)**

History of aviation, rocketry, and space flights; fundamentals, descriptions of propulsion of flight vehicles, trajectories and orbital mechanics, aerodynamics, re-entry, pyrotechnics, nucleonics, electrical power for guidance, telecommunication; aerospace environment, flight vehicles, spacecraft, and sounding rockets. 3 lectures. Prerequisite: Junior standing.

**Aero 408 Advanced Flight Vehicle Structural Analysis (4)**

Deformation of determinate and indeterminate structures. Virtual work. Dummy load method, Maxwell-Betti reciprocal theorem, Castigliano's theorem. Introduction to matrix methods. 3 lectures, 1 laboratory. Prerequisite: Aero 324, Math 318.

**Aero 409 Flight Testing (3)**

Flight test instrumentation, obtaining of data and methods of data reduction for determining aircraft and engine performance, aircraft stability and control and structural integrity. 3 lectures. Prerequisite: Aero 306.

**Aero 411 Space Technology (3)**

Motion of a body in the central force field. Space vehicle trajectories, guidance systems, power generators for interplanetary travel, structural loading, and principles of space vehicle design. 3 lectures.

**Aero 415 Aerodynamics of Stability and Control (3)**

Equations of motion of the airplane in six degrees of freedom and the aerodynamic forces involved. Static longitudinal and directional stability. Lateral motion and control. Dynamic longitudinal stability. 3 lectures. Prerequisite: Aero 306.

**Aero 416 Unconventional Aircraft (3)**

Introduction to analysis of rotary wing aircraft, VTOL, STOL, and lifting body vehicles. Types of flight control mechanism. Performance and stability of vehicles. 3 lectures. Prerequisite: Aero 306.

**Aero 444, 445 Flight Vehicle Design Laboratory (4) (4)**

Preliminary layout of a typical transport aircraft and a space vehicle using design and calculation techniques developed in previous aeronautical engineering courses. Design of selected component structures and preparation of necessary drawings. 2 lectures, 2 laboratories. Prerequisite: Aero 306.

**Aero 461, 462 Senior Project (2) (2)**

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

**Aero 463 Undergraduate Seminar (2)**

Studies and technical developments in the field of Aeronautical Engineering. 2 meetings. Prerequisite: Senior standing.

**Aero 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Aero 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**Aero 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**Aero 501 Advanced Flight Dynamics (3)**

Derivation of full six degrees of freedom of motion of missiles and space vehicles in both linear and nonlinear applications; closed form and computer numerical integrations; advanced dynamic flight testing and dynamic wind tunnel testing. 3 lectures. Prerequisite: Consent of instructor.

**Aero 503 Advanced Structural Analysis (3)**

Deformations of aircraft structures due to static and dynamic loads. Computation of natural mode shapes and frequencies. Determination of dynamic stress fields in aircraft due to transient motions caused by external forces. 3 lectures. Prerequisite: ME 427 or senior level structural design course.

**Aero 505 Theoretical Aerodynamics (3)**

Fundamentals of analytical aerodynamics, potential flow, vortex theory, circulation, Kutta Joukowski theorem, lifting line theory, three dimensional lift and drag of wings, performance, stability and control. 3 lectures. Prerequisite: Aero 306 or equivalent.

**Aero 506 Elements of Rocket Propulsion (3)**

Analysis and design of liquid and solid rockets using basic design parameters such as droplet atomization, droplet and particle combustion, heat transfer, combustion stability and control, and thermochemical computations. 3 lectures. Prerequisite: Aero 401 or equivalent.

**Aero 507 Fuels and Propellants (3)**

Properties of liquid, solid, and gaseous fuels and propellants. Combustion and reaction thermodynamics; theoretical specific impulse computation. Flame theory; ionization and high temperature gas dynamics. 3 lectures. Prerequisite: Graduate standing.

**Aero 551 Aeronautical Systems Analysis (3)**

Various system modeling methods applied to aeronautical systems. System stability studies and system optimization methods. 3 lectures. Prerequisite: Consent of instructor.

## **AGRICULTURAL EDUCATION**

**Ag Ed 202 Introduction to Agricultural Education (2)**

Overview of agricultural education programs including goals and purposes. Kinds of classes and types of programs. Qualifications essential to success in teaching agriculture. Planned program of studies to meet requirement for teaching. 2 lectures.

**Ag Ed 303 F.F.A. Programs and Activities (2)**

Implementation processes and operational procedures for conducting an F.F.A. Chapter activities program appropriate to community, school and student needs. F.F.A. leadership training, proficiency awards, foundation programs and educational field days. 2 activities. Prerequisite: AgEd 202 and permission of instructor.

**Ag Ed 339 Supervised Agricultural Experiences (2)**

Supervised observation and participation in public school and/or agricultural industry. Exposure to processes and procedures for supervising rural youth organizations and occupational experience programs. 2 activities. Prerequisite: AgEd 202 and consent of instructor.

**Ag Ed 424 Organizing and Teaching Agriculture (3)**

Determining course objectives, content, and calendar for use by the teacher in classroom, shop and field instruction while assigned to community schools. Concurrent with student teaching. 3 activities. Prerequisite: AgEd 438 and consent of instructor.



**Ag Ed 438 Instructional Processes in Agricultural Education (3)**

Preparation for student teaching in agriculture. Orientation to classroom situation. Development of plans for teaching including daily lessons and unit plans; utilization of source information and resources. Class demonstration in teaching procedures; analysis and evaluation. 1 lecture, 2 activities.

**Ag Ed 440 Student Teaching in Agricultural Education (6–12)**

Off-campus assignment to a selected cooperating public school. Participation in all phases of agriculture teacher duties and activities including departmental organization and administration. Prior approval and appointment necessary. Total limited to 18 units.

**Ag Ed 441 Student Teaching Practicum (2)**

Problems encountered and practices applied during student teaching. Methods, procedures and materials adapted for use by the teacher concurrent with student teaching. 2 activities. Prerequisite: Consent of instructor.

**Ag Ed 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**Ag Ed 463 Undergraduate Seminar (2)**

Group discussion of current agricultural education topics presented by individual class members. Topics or papers presented by guest speakers. Placement opportunities and requirements. 2 lectures.

**Ag Ed 470 Selected Advanced Topics (1–3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Ag Ed 471 Selected Advanced Laboratory (1–3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

**Ag Ed 513 Field Experience—Vocational Agriculture (1–3)**

Practice and techniques in management and supervision of vocational agriculture programs. Relationships among students, staff, community and school groups. Budgeting, staffing, records, reporting. Student activities and Future Farmers of America programs. Total credit limited to 6 units. Prerequisite: Prior approval and appointment.

**Ag Ed 520 Program Development in Agricultural Education (3)**

Development of up-to-date approaches to a total integrated program based on occupational opportunities and community needs. Philosophy, organization and administration of agricultural education programs. Development in such areas as curriculum, supervised occupational experience, Future Farmers of America, and summer programs. 3 lectures.

**Ag Ed 522 Instructional Programs in Agricultural Mechanics (3)**

Organizing the vocational agriculture mechanics curriculum and determining course content. Student demonstrations and presentations; evaluation and analysis. 1 lecture, 2 laboratories.

## Ag Ed 580 Special Problems in Agricultural Education (1-3)

Individual study of modern issues and problems conducted through research, planning and development. Field problems and in-service study in agricultural industry encouraged. Final written report to be submitted. Total credit limited to nine units with not more than three units in any one quarter. Prior approval of instructor required.

## AGRICULTURAL ENGINEERING

### AE 121 Agricultural Mechanics (2)

Identification and use of tools and materials; tool sharpening and care; concrete mixes and materials; simple electric wiring; metal work; pipe fitting; basic woodworking; estimating quantities and costs. 1 lecture, 1 laboratory.

### AE 122 Agricultural Mechanics (2)

Design, construction and repair of production equipment for livestock, dairy and poultry equipment. 1 lecture, 1 laboratory. Prerequisite: AE 121 or demonstrated equivalent ability.

### AE 124 Small Power Units (2)

Operating principles of the small internal combustion engine. Maintenance and troubleshooting applications of small power units to mowers and other landscape equipment. Repair procedures related to economic justifications. 1 lecture, 1 two-hour activity.

### AE 128 Agricultural Mechanics (3)

Introduction to agricultural engineering and mechanized agriculture. Properties and marketing information on agricultural construction materials. Laboratory skills development in wood, metal, and concrete. 2 lectures, 1 laboratory. Prerequisite: Majors only, Math 113 or equivalent, college drafting or concurrent enrollment.

### AE 131 Agricultural Surveying (2)

Introduction to basic surveying techniques as applied to agriculture. Keeping field notes; land measurement by tape; differential and profile leveling; contour and plane table mapping; land surveying and identification; fundamentals of land grading. 1 lecture, 1 laboratory. Prerequisite: Math 103.

### AE 133 Agricultural Drafting (3)

A basic course in technical drawing oriented toward working drawings of farm shop projects. Freehand sketching and instrument techniques. Multiview projection and pictorial drawings. 1 lecture, 2 laboratories. Prerequisite: Mechanized Agriculture major or consent of instructor.

### AE 134 Agricultural Electrification (3)

Fundamentals of circuits, electric wiring and code regulations, load distribution. Wiring of agricultural structures and systems. Emphasis on practical applications. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 113.

### AE 141 Agricultural Tractors and Equipment Skills (3)

Operational skills in the selection and matching of agricultural and utility industrial equipment. Supervised operational practice in the field. 2 lectures, 1 laboratory.

### AE 142 Agricultural Power and Machinery Management (4)

Evaluation of agricultural tractors and machinery performance. Power applications and hydraulic systems. Evaluation of performance of tillage, seeding and planting, weed control, hay and grain harvesting, and farm processing equipment. Emphasis on management. Selection, operation, maintenance, and cost analysis. 3 lectures, 1 laboratory. Prerequisite: Math 103.

### AE 143 Power and Machinery (4)

Performance of tractors and machinery. Evaluation of tillage, planting, and harvesting operations. Analysis and development of optimum mechanical systems. 3 lectures, 1 laboratory. Prerequisite: Math 114 or equivalent, AE 128.

**AE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**AE 231 Agricultural Building Construction (3)**

Development of practical skills in carpentry and light construction. Selection of materials. Agricultural buildings repaired, constructed, or modified during laboratory periods. 1 lecture, 2 laboratories. Prerequisite: AE 128 or consent of instructor.

**AE 232 Agricultural Structures Planning (3)**

Environmental factors affecting crop storage structures and annual housing. Insulation, heating, ventilation, water supply, and waste disposal. Functional planning of production systems. 2 lectures, 1 laboratory. Prerequisite: Phys 132 and college drafting.

**AE 234 Agricultural Power Transmission and Mechanics (3)**

Elements in the utilization and transmission of power in agriculture with emphasis on mechanics. 2 lectures, 1 laboratory. Prerequisite: AE 143, Phys 121.

**AE 236 Principles of Irrigation (4)**

Land grading design, operation, management, and evaluation of irrigation methods. 3 lectures, 1 laboratory. Prerequisite: Math 141, AE 237.

**AE 237 Engineering Surveying (2)**

Selection, care and use of tapes, levels and transits. Keeping field notes; land measurements by tape; differential and profile leveling; and the plotting of profiles. Introduction to the transit; field operation; introduction to traverses. 1 lecture, 1 field period. Prerequisite: Math 115 or equivalent; college drafting.

**AE 238 Engineering Surveying (2)**

Use of the transit: traverses, coordinates, triangulation, area and balanced survey calculations. Cross sections, landgrading, and volumes. Topographic and contour by stadia-transit mapping. 1 lecture, 1 field period. Prerequisite: AE 237.

**AE 239 Engineering Surveying (2)**

Parabolic curves, circular curves, cross sectioning, setting slope stakes, measuring earth volume, cuts and fills as applied to road beds, public land surveys, photogrammetry. 1 lecture, 1 field period. Prerequisite: AE 238.

**AE 240 Agricultural Engineering Laboratory (1-2)**

Total credit limited to 4 units with no more than 2 units in any one quarter. 1 or 2 laboratories.

**AE 301 Closed Circuit Hydraulics (3)**

Proper selection and maintenance of machine components using standardized design procedures and manufacturer's design literature. 2 lectures, 1 laboratory. Prerequisite: AE 234 or 312.

**AE 312 Hydraulics (4)**

Static and dynamic characteristics of liquids, flow in open and closed channels, uniform and non-uniform flow, flow measurement, pumps. 3 lectures, 1 laboratory. Prerequisite: Phys 132, ME 211.

**AE 315 Hydrology (3)**

Collection, organization and use of precipitation and runoff data, flood frequency and economics of structures, stream gauging and use of hydrograph, principles of groundwater management and flood routing. 3 lectures. Prerequisite: Math 141.

**AE 321 Agricultural Equipment Industry Management (4)**

Management and operation of the farm equipment industry. Study of sales, service, parts and product education policies on manufacturer, distributor and dealer level. 3 lectures, 1 laboratory. Prerequisite: AE 142 or AE 143.

**AE 322 Principles of Agricultural Machinery (4)**

A wide range of applied agricultural machine design problems using stress deflection analysis. Selection of shafts, couplings, clutches, brakes, bearings, and other machine parts. 3 lectures, 1 laboratory. Prerequisite: AE 343.

**AE 323 Agricultural Products Handling (3)**

The application of product handling techniques and equipment to the processing of agricultural commodities. 2 lectures, 1 laboratory. Prerequisite: Phys 123 or consent of instructor.

**AE 324 Principles of Agricultural Electrification (4)**

R-L-C circuits. Applications of electricity in agriculture including motor principles and selection, wiring, and other topics. 3 lectures, 1 laboratory. Prerequisite: AE 134, Phys 123.

**AE 326 Off-the-Road Locomotion (3)**

Sources and systems for supplying power to off-the-highway vehicles. Theory of traction, soil equipment mechanics, prime mover and implement combinations. 2 lectures, 1 laboratory. Prerequisite: AE 143, ME 211, 302.

**AE 331 Irrigation Theory (3)**

Plant-water-soil relations concerning evapo-transpiration, plant stress, soil moisture deficiency, frequency and depth of irrigation, salinity, soil-water relations, saturated and unsaturated flow, soil aeration, infiltration, and drainage. 3 lectures. Prerequisite: SS 121, Math 141.

**AE 333 Engineering Properties of Agricultural Materials (3)**

Principles of analyzing the mechanical, electrical, thermal, rheological and optical characteristics of agricultural materials. 2 lectures, 1 laboratory. Prerequisite: CE 208, Phys 133.

**AE 335 Agricultural Power (3)**

Principles of spark ignition and compression ignition engines, including liquefied petroleum gas equipment, and related accessories. Service, trouble-shooting and repair procedures of engines and transmissions. 2 lectures, 1 laboratory.

**AE 336 Agricultural Power Analysis (3)**

Selection and application of internal combustion engines. Theory of combustion, fuels, and lubricants; power and its measurement. Factors affecting horsepower output and engine efficiency. Advanced power transmission. 2 lectures, 1 laboratory. Prerequisite: AE 335, Phys 123.

**AE 337 Landscape Irrigation (3)**

Design of landscape irrigation systems including soil factors, hydraulics, site information, selection of system components, back flow prevention, plumbing codes and cost estimating. 2 lectures, 1 laboratory. Prerequisite: SS 121 or consent of instructor.

**AE 338 Dynamic Measurement (3)**

Engineering measurements and basic instrumentation. Transducers, signal processors, output devices and controls used in agricultural engineering. 2 lectures, 1 laboratory. Prerequisite: EE 201, 261.

**AE 339 Agricultural Mechanics Skills (2)**

Advanced shop skills. Carpentry, electricity, plumbing, surveying, power mechanics, tractor equipment operation and maintenance. 1 lecture, 1 laboratory. Prerequisite: Junior standing.

**AE 340 Irrigation Water Management (4)**

Soil-plant-water relationships, consumptive use rates and irrigation schedules, water quality, salinity and drainage; evaluations of irrigation methods, water rights and irrigation institutions. Flow of water in pipes and canals, water measurement, wells, and pumps. 3 lectures, 1 laboratory. Prerequisite: SS 121, Math 103 or equivalent.

**AE 341 Gasoline Engine Diagnosis (3)**

Use of modern engine testing equipment in the evaluation of engine components and accessories such as: cylinder condition, ignition systems, electrical systems, and fuel systems. 2 lectures, 1 laboratory. Prerequisite: AE 335 or equivalent.

**AE 342 Diesel Fuel Systems (3)**

Use of modern test and service equipment in evaluating and servicing diesel fuel systems. 2 lectures, 1 laboratory. Prerequisite: AE 335 or equivalent.

**AE 343 Project Analysis (4)**

Analysis of projects for structural design, applied elements of dynamics, strength of materials, fabrication, and fasteners. 3 lectures, 1 laboratory. Prerequisite: AE 133 or equivalent, Phys 121, AE 234.

**AE 344 Agricultural Equipment Projects (3)**

Construction of special agricultural equipment related to any agricultural enterprise. 1 lecture, 2 laboratories. Prerequisite: AE 343.

**AE 345 Aerial Photogrammetry (3)**

Object recognition, three-dimensional equipment, and interpretation. Print alignment, stereoscopic viewing, scales, elevation determination, and application. Familiarization with geological, agricultural, land and crop management, engineering surveys, construction data, topographic detail, drainage elevation and control. Color photo techniques and uses for pest and disease location and control. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 114.

**AE 346 Emission Control (3)**

Pollution control devices as found on common agricultural vehicles, light duty trucks and related automotive applications. Local and Federal regulations governing engine emissions. Preparation for state pollution device licensee test. 2 lectures, 1 laboratory. Prerequisite: AE 341 or equivalent.

**AE 392 Wells and Pumps (3)**

Ground water resources, drilling methods, and development of wells. Pumps and their uses in agricultural applications. Selection of pumping systems for different water sources. Design of domestic water systems. Water quality standards and water conditioning. 2 lectures, 1 laboratory. Prerequisite: AE 340 or consent of instructor.

**AE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems in agriculture. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**AE 403 Agricultural Systems Engineering (3)**

Engineering principles combined with mathematical optimization techniques to evaluate parameters in agricultural production and processing systems. 3 lectures. Prerequisite: IE 414, Math 242, Engr 251, Stat 321.

**AE 414 Irrigation and Drainage Engineering (4)**

Design of farm and project irrigation and drainage systems. Influence of soils, crops, climate, and costs on the frequency, rate, and duration of economical water delivery. Pipeline and ditch distribution systems; reservoirs, pumps, and drains; economics of systems and components. 3 lectures, 1 laboratory. Prerequisite: AE 236, 312, 331.

**AE 421 Equipment Engineering (4)**

Design and construction of specialized agricultural equipment. 2 lectures, 2 laboratories. Prerequisite: CE 209, ME 212, ETWT 144.

**AE 422 Equipment Engineering (3)**

Analysis and design of equipment with emphasis on man-machine-plant-automata relationships and concepts. 2 lectures, 1 laboratory. Prerequisite: AE 421.

**AE 425 Electrical and Electronic Controls for Agricultural Equipment (3)**

The principles and selection of electrical and electronic controls for use in the agricultural industry. Applications in agricultural machinery, agricultural structures, agricultural processing and irrigation. 2 lectures, 1 laboratory. Prerequisite: AE 324.

**AE 427 Agricultural Process Engineering (3)**

Thermodynamics and mass transfer principles applied to air, water, air-water mixtures, drying, heating, refrigeration, fluid flow, size reduction, fan laws and materials handling. 2 lectures, 1 laboratory. Prerequisite: AE 312 and EnvE 313.

**AE 432 Agricultural Buildings (4)**

Selection of buildings, storage units, and related equipment for production agriculture. Environmental factors affecting crop storage and animal housing. Farmstead layouts. Working drawings and cost estimates. 3 lectures, 1 laboratory. Prerequisite: AE 133, 231, 343.

**AE 433 Agricultural Structures Design (4)**

Structural analysis and design of agricultural service and processing buildings. Emphasis on use of wood, metals, and reinforced concrete in light construction. 3 lectures, 1 laboratory. Prerequisite: AE 232, CE 209.

**AE 435 Drainage (3)**

Flow of water in porous media; intrinsic permeability and hydraulic conductivity; flow nets; wells and ground water; design of sub-surface drains. 2 lectures, 1 laboratory. Prerequisite: AE 312, 331, or 340 and approval of instructor.

**AE 437 Conservation Engineering (4)**

Engineering and management practices to conserve soil and water resources. Check dams, terraces and water storage dams; strip and cover cropping, contour tillage; applications of soil mechanics, hydraulics, and hydrology to design of erosion control structures; flow nets, tractive force hydraulics, and geology. 3 lectures, 1 laboratory. Prerequisite: AE 312, 315.

**AE 445 Remote Sensing (3)**

Nature of electromagnetic radiation as it relates to sensing systems, effects of atmosphere on radiation transfer, electro-optical remote sensing, imaging and non-imaging sensors, microwave remote sensors, remote sensor data systems, and ground investigations in support of remote sensing. 2 lectures, 1 laboratory. Prerequisite: AE 345.

**AE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**AE 463 Undergraduate Seminar (2)**

Group discussion of current agricultural engineering topics presented by individual members of the class. Topics or papers presented by guest speakers. Placement opportunities and requirements. 2 lectures.

**AE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**AE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**AE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Graduate standing and consent of instructor.

**AE 581 Graduate Seminar in Agricultural Engineering (3)**

Group study of current engineering problems and recent developments as they relate to agriculture. Problem identification, statement and research methodology are emphasized in problem solution. 3 seminars.

## **AGRICULTURAL MANAGEMENT**

**AM 099 Farm Records (4)**

Farm record keeping for tax, management and credit purposes using the cash method of accounting. An overview of the accrual system and measures of farm profits. May not be substituted for AM 321 or AM 322. 3 lectures, 1 two-hour laboratory. To be taken by technical students.

**AM 101 Introduction to Agricultural Management (3)**

Relationship of Agricultural Management to characteristics, problems and challenges of agriculture. Student report on background, goals and educational plan. 3 lectures. Prerequisite: Agricultural Management major of freshman standing or consent of instructor.

**AM 102 Introduction to Agricultural Economics (3)**

Introduction to the economic aspects of agricultural management. The role of agricultural resources in economic growth. Survey of trade, policy, and marketing activities of agriculture. 3 lectures.

**AM 140 Calculator Operation for Agriculture (1)**

Introduction to and application of calculator-type machines to basic agriculturally related quantitative and statistical problems. 1 activity.

**AM 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**AM 201 Agricultural Business Sales and Service (3)**

Growth and opportunities in agricultural sales. Factors involved in developing sales program for the farm operation. Application of successful selling principles and practices in providing farm operators with agricultural materials, supplies, equipment and services. Consideration given to sales and service for farm related businesses and non-agricultural customers. Selling aspects involved in marketing of farm products by farm related businesses. 3 lectures.

**AM 203 Agricultural Business Organization (3)**

Development, types and forms of farm related businesses. Agricultural businesses considered from standpoint of primary functions, services and problems including such factors as business organization, records, information, location, production, business with banks, labor and government. Emphasis on California farm related industries. 3 lectures.

**AM 212 Agricultural Economics (3)**

Changes in agriculture and agricultural production in response to changing economic conditions. Optimum methods of agricultural production. Impact of technological change. Evaluating market structure and price formulating factors for agricultural products and inputs. 3 lectures. Prerequisite: Econ 211.

**AM 213 Agricultural Economic Analysis (4)**

Role of price in the economy, the firm as a decision-making unit, the production function, single input-output analysis, substitution relationships, products combinations, risk analysis, consumption and market demand influence, population and technological changes. 4 lectures. Prerequisite: AM 212.

**AM 230 General Agricultural Management (3)**

General introduction and overview of Agricultural Management; principles and procedures in planning, organizing and managing farm related agribusinesses. Taken by non-Agricultural Management majors. 3 lectures.

**AM 250 Computer Application to Agriculture (3)**

Use of library programs available for agriculture. Use of auxiliary equipment available at commercial computer centers. Statistical and other computer programs applied to agriculture problems. 3 lectures.

**AM 300 Successful California Farms (2)**

Visits to successful California farms involving many types of farming. Study of farm resources and organization, techniques of operation, yields, problems. Different regions visited on different trips. Total credit limited to 4 units.

**AM 301 Agricultural Marketing (3)**

Agricultural commodity marketing systems from farm to consumer. Middlemen types and marketing alternatives. Role of futures markets in pricing and risk minimization. Storage, transportation and grading systems. Selected topics such as foreign trade and marketing orders. 3 lectures. Prerequisite: Econ 201 or 211.

**AM 302 Agricultural Cooperative Organization and Management (3)**

Purpose, kinds, organization and management of agricultural cooperatives. Emphasis on California cooperatives, their characteristics, operation and future. 2 lectures, 1 two-hour laboratory.

**AM 305 Agricultural Resources (3)**

Survey of agricultural production areas of United States from standpoint of physical resource, markets, economic advantages, and problems. Appraisal of area problem from standpoint of land economic principles. 3 lectures. Prerequisite: Econ 201 or 211.

**AM 307 World Agricultural Resources (3)**

World agricultural production areas with emphasis on natural and human resources, existing production, economic implications, population growth and potential food supply. 3 lectures. Prerequisite: Econ 201 or 211.

**AM 310 Agricultural Credit and Finance (3)**

Fundamentals of financing California's agricultural industry. Principles of making investment decisions and costs of credit. Developing credit strategies within the framework of sources of credit and types of loans available to farms, ranches, and agribusiness firms. 3 lectures. Prerequisite: One quarter of accounting, farm records, or consent of the instructor.

**AM 312 Agricultural Policy (3)**

Agricultural policy objectives and formulation, resource allocation and production adjustments. Survey of government's influence in the planning and practices of farmers and agricultural businesses. 3 lectures. Prerequisite: Econ 211.

**AM 314 Fair Management (3)**

Principles and procedures in organizing, managing and promoting fairs. Emphasis on California and Western fairs. Career opportunities, programs and problems in fair management and growth of fairs in America. 3 lectures.



**AM 315 Land Economics (3)**

Supply of land, population pressure on land, input-output relations affecting land use, economic returns, land values, development and investment costs, locational factors, conservation, institutional factors, leasing, land use planning, taxation, public regulations. 3 lectures. Prerequisite: Econ 201 or 211.

**AM 317 Agriculture—Consumer Relationships (2)**

Basic facts, public opinion and ways of developing greater understanding of agriculture, its nature, characteristics, problems and relationship to non-farm persons. Consumer education programs and procedures. 2 lectures.

**AM 318 Agricultural Trade Policies (3)**

Analysis of American trade policies and their relationship to agriculture. International trade pacts and their influence on agricultural production and marketing. 3 lectures. Prerequisite: Econ 201 or 211, AM 301.

**AM 321 Farm Records (4)**

Fundamentals of record keeping, kinds of records, inventory, depreciation, payrolls, cash and accrual basis of income tax reporting, financial statements and analysis. 3 lectures, 1 two-hour laboratory. Prerequisite: Econ 201 or 211.

**AM 322 Principles of Farm Management (4)**

Study of organization and operation of farm and ranch businesses. Identification of factors affecting profitability and implementation of them in the evaluation of the business to increase efficiency and profit. Application of budgeting to laboratory farms and independent analysis of a farm for the term report. 3 lectures, 1 two-hour laboratory. Prerequisite: AM 321 or Actg 222.

**AM 323 Agricultural Business Managerial Accounting (4)**

Agricultural Business Management with an emphasis on using accounting procedures that will provide useful information in making management decisions, setting objectives, and controlling operations. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 222.

**AM 324 Agricultural Property Management and Sales (4)**

Land economic, legal and real estate principles in the investment, development, leasing, mortgaging and transferring of agricultural real estate. 3 lectures, 1 two-hour laboratory.

**AM 325 California Agriculture (3)**

Agricultural regions of California considered from standpoint of physical resources, crops and livestock, size, tenure, water problems, relation to urban areas, land law, land development, and property taxation. 2 lectures, 1 two-hour laboratory. Prerequisite: Econ 201 or 211.

**AM 326 Farm Appraisal (4)**

Methods of farm appraisal, use of county records, appraisal practice on different types of farms, discussions with professional appraisers. 3 lectures, 1 2-hour laboratory. Prerequisite: Econ 211 and junior standing.

**AM 336 Commodity Markets in Agricultural Business (3)**

Commodity market history, performance, and use in management of agricultural business. Techniques of analysis, hedging, speculation with applications to the agricultural business firm. 2 lectures, 1 two-hour laboratory. Prerequisite: AM 212 or permission of instructor.

**AM 360 Agricultural Management Research Methods (3)**

Concepts of research methodology and data presentation in Agricultural Management. The scientific method and its application to problems in the field. Selection of methodology compatible with the problem. Overview of research from conceptualization to finalized report. 3 lectures.

**AM 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AM 401 Agricultural Labor Relations and Personnel Management (4)**

Agricultural labor trends and problems as determined by changes occurring in farming and farm related industries. Labor-management relations in agriculture; principles and procedures in organizing and managing the agricultural business personnel program. 4 lectures. Prerequisite: Senior standing.

**AM 404 Agricultural Marketing Management (3)**

Marketing management applied to agricultural and food industries. The marketing concept, the role of today's middlemen and the growing importance of consumerism, ecology and conservation in today's changing market place. Exploration of marketing mix decisions including planning, product management, pricing, promotion and distribution. 3 lectures.

**AM 405 Agricultural Marketing Research Methods (3)**

Collecting, tabulating and analyzing data for use in market research and sales. Techniques for determining market potential. Surveys, trends, correlation, market factor derivation, test marketing. Routing techniques, sampling procedures. 3 lectures. Prerequisite: AM 250, Stat 211.

**AM 406 Agricultural Business Communication (3)**

Principles, methods and materials for communicating ideas, information and skills to management, staff members, stockholders, customers and general public. Agricultural business public relations programs. Organization and presentation of surveys, studies, reports and publications. 2 lectures, 1 two-hour laboratory. Prerequisite: AM 405, or consent of instructor.

**AM 408 Advanced Agricultural Economic Analysis (3)**

Application of optimization and managerial economic methods to the solution of agricultural management problems. Use of mini-max principles, capital budgeting, game and decision theory, model development and simulation in agriculture. Consideration of choice of model on the results of a study. 3 lectures. Prerequisite: AM 213, Stat 212.

**AM 409 California Agricultural Law (3)**

Historical and current sources of law, examination of judicial systems, application of contracts, agency, labor law, torts, property and water law, partnerships, corporations and corporate finance applicable to agricultural enterprises. 3 lectures. Prerequisite: Bus 207, senior standing or consent of instructor.

**AM 413 Crop Management Problems (3)**

Management problems of crop farms and orchards: crop enterprise costing procedures, equipment costing and replacement, scheduling of operations to obtain efficiencies, determination of most profitable rotations and levels of input use, planning for changes in operation, orchard development, investment analysis. 3 lectures. Prerequisite: AM 322.

**AM 415 Livestock Management Problems (3)**

Analysis of actual livestock enterprise; budgeting a ranch by enterprises; analysis of internal problems such as bull purchase economics, feed buying chart, feedyard economics, cattle price relationships, livestock systems. 3 lectures. Prerequisite: AM 322.

**AM 416 Livestock Management Problems (3)**

Analysis of actual dairy enterprise; budgeting a dairy farm by enterprises; analysis of problems such as load by load milk-feed analysis, value of milk quotas, most profitable concentrate to hay feeding. 3 lectures. Prerequisite: AM 322.

**AM 421 Agricultural Business Operations Analysis (4)**

Principles and procedures in agricultural business operations analysis and research. Evaluation of programs and problems to achieve optimal decisions. Production and financial data, statistics, pricing, costs, inventories, production level, and plant expansion or contraction. 3 lectures, 1 two-hour laboratory. Prerequisite: AM 213, Stat 212.

**AM 427 Agricultural Estate Planning (4)**

Principles and procedures in agriculture estate planning and conservation. Determining agriculture estate assets, taxes, property valuation, property transfers, beneficiaries and needs, gifts, insurance, business estate, employee estate, wills, trusts, and administration of trusts and estates. 3 lectures, 1 activity period. Prerequisite: AM 324.

**AM 431 Large Farm Accounting (4)**

Application of commercial accounting process to large farm accounting problems. Emphasis will be placed on accounting systems that facilitate financial statement presentation, tax preparation and ADP enterprise analysis. Income tax laws pertaining to the farm will be stressed. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 222.

**AM 433 Agricultural Price Analysis (3)**

Application of statistical tools for price analysis. Emphasis on price making process for specific agricultural commodities. Utilization of market reports and production estimate data in price forecasting and analysis. 2 lectures, 1 two-hour laboratory. Prerequisite: Stat 212 and AM 250.

**AM 435 Linear Programming in Agriculture (3)**

Application of linear programming to modern commercial agriculture; assumptions and data requirements; graphic and simplex solutions; preparation, coding and solutions of models simulating current problems. 2 lectures, 1 two-hour laboratory. Prerequisite: AM 250.

**AM 440 Field Studies in Agricultural Management (2)**

Visitation to selected agricultural businesses. Organization, operation, services and problems considered. Prerequisite: Senior standing or consent of instructor.

**AM 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

**AM 463 Undergraduate Seminar (2)**

Individual or group presentation for discussion of subjects and problems within the Agricultural Management field. 2 lectures.

**AM 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**AM 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**AM 510 World Agricultural Development (3)**

Special problems of agriculture in less developed countries considering the role of economic, social and institutional policies in directing development. 3 lectures. Prerequisite: AM 307 or 315.

**AM 515 International Agricultural Marketing (3)**

Organization and function of international agricultural markets with emphasis on developing countries. Factors inhibiting development of an improved agricultural market structure. 3 lectures. Prerequisites: AM 301, AM 307 or consent of instructor.

**AM 516 Communication for Change in Developing Countries (3)**

Analysis of literature, techniques and procedures for planning and carrying out agricultural information programs in developing countries. Current relevant information for foreign agricultural producers. 3 lectures. Prerequisite: AM 307.

#### **AM 581 Graduate Seminar in Agricultural Management (3)**

Group study of selected developments, trends and problems in the field. 3 lecture-discussions.

### **AGRICULTURE**

#### **Ag 050 Agriculture Enterprise Project (0)**

Selection and completion of a management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Foundation. Students do not receive academic credit for enterprise projects. Registration is through department offices and subtopics will list the department supervising the project.

#### **Ag 301 Agriculture and American Life (3)**

Relationship of agriculture and natural resources to man and his society. Impact of soil, water, and land uses on animal and crop production within the United States. Relative importance of resources used and commodities produced. Not open to students with majors in agriculture and natural resources. 3 lectures. Prerequisite: Junior standing.

#### **Ag 339 Internship in Agriculture (1-12)**

The selected student will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading. Prerequisite: Consent of instructor.

#### **Ag 500 Individual Study (1-3)**

Advanced independent study planned and completed under the direction of a member of the school faculty. Enrollment by petition. Total credit limited to 9 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

#### **Ag 599 Thesis (3 (3) (3))**

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing and consent of instructor.

### **ANIMAL SCIENCE**

#### **A Sci 101 Feeds and Feeding (4)**

Simple use of food nutrients. Identification and classification of feeds for each class of livestock. The digestion and utilization of feeds. Feeding standards and computation of simple rations for livestock. Economy in feeding and purchasing feeds by nutritive values. 3 lectures, 1 laboratory.

#### **A Sci 111 Market Beef Production (3)**

Breeds, market classes, and grades of beef cattle. Selection of feeder cattle. Management practices in purchasing and fattening cattle using farm grown feeds. Study of cattle feeding operations carried on at the college. Marketing of beef cattle. 3 lectures. Prerequisite: A Sci 101.

#### **A Sci 112 Elements of Swine Production (3)**

History, development and importance of swine industry. Types, breeds, market classes and grades of swine. Basic principles and practice of swine feeding and management. 3 lectures.

#### **A Sci 113 Elements of Sheep Production (3)**

Survey of the types of sheep operations in California. Breed study, market classes, and grades identification. Commercial fattening of lambs in dry lot and irrigated pasture programs. Calendar of operations for the various types of sheep enterprises. 3 lectures.

**A Sci 131 Basic Equitation (3)**

Grooming, saddling, bridling, mounting, seat and hands. Horsemanship both under saddle and bareback. Basic care of the horse. Study of types of horse gear and equipment. Designed to teach basic riding to students with no previous experience. Advanced sign-up with instructor required. 1 lecture, 2 laboratories.

**A Sci 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**A Sci 211 Commercial Beef Management (3)**

Care and management of a breeding herd of commercial cattle in California. Range and farm lands suited to beef production. Factors affecting cost of production. Improvement of breeding herd. Trends in the industry. 3 lectures. Prerequisite: A Sci 101, 111.

**A Sci 212 Swine Management (3)**

Management practices involved in commercial and purebred swine enterprises. Methods of production and marketing, performance testing programs and carcass evaluation techniques. Nutritional requirements, rations, diseases and parasites, facilities and equipment. 3 lectures. Prerequisite: A Sci 101, 112.

**A Sci 213 Sheep Management (3)**

Detailed study of managerial practices for both commercial and purebred sheep enterprises. Performance testing and carcass evaluation techniques. The preparation and merchandising of the wool clip. Introduction to wool processing. 3 lectures. Prerequisite: A Sci 101, 113.

**A Sci 226 Livestock Evaluation (3)**

Utilization of objective and subjective estimation measures in establishing economic worth of domestic animals of the three meat animal species and horses. 1 lecture, 2 laboratories.

**A Sci 229 Range Management (4)**

Characteristics of rangeland, identification of range plants, management practices to maintain range resources and increase production of forage and livestock. 3 lectures, 1 laboratory. Prerequisite: SS 121, A Sci 111 or 230, a botany or crops science course.

**A Sci 230 General Animal Science (4)**

For non-animal science majors. Selection, feeding, and management of sheep, swine, and cattle, and their uses on California farms. 3 lectures, 1 laboratory.

**A Sci 232 Elements of Horse Management (4)**

Status of the horse industry. Breeds of horses and their uses. Anatomy and parts of the horse, horse judging. Study of good and faulty conformation. Unsoundnesses, ailments and their treatment. Determination of age. Early history of the horse. 3 lectures, 1 laboratory. Prerequisite: A Sci 101.

**A Sci 234 Horseshoeing (2)**

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern, and legs. Trimming feet, fitting and nailing shoes. Normal shoeing, corrective shoeing. 1 lecture, 1 laboratory combined.

**A Sci 241 Applied Beef Cattle Practices (2)**

Application of operational practices in the purchasing, management, and marketing of beef cattle. Equipment, preventive veterinary practices, live animal evaluation, performance records, carcass evaluation, and ranch evaluation. 1 lecture, 1 activity.

**A Sci 242 Applied Swine Management Practices (2)**

Application of operational practices in the management and merchandising of swine. Housing and equipment, routine veterinary practices, live animal evaluation, performance evaluations, farrowing and post-farrowing practices, and carcass appraisal. 1 lecture, 1 activity.

**A Sci 243 Applied Sheep Management Practices (2)**

Flock management; sheep handling techniques; breed evaluation; preparation for exhibition; internal and external parasite control; tagging, shearing, foot trimming; selection; culling and identification. Marking techniques. Wool grading and judging. Market lamb and carcass evaluation. 1 lecture, 1 activity.

**A Sci 302 Applied Animal Nutrition (3)**

Feedstuff evaluation and analysis. Advancements in feedstuff evaluation and application to ration formulation. Principles and practices in livestock ration formulation. Linear programming principles as applied to computer formulated rations. 2 lectures, 1 laboratory. Prerequisite: A Sci 101, Chem 226.

**A Sci 304 Animal Breeding (3)**

Application of genetics to the improvement of farm animals. Improving production through a study of mating systems including outbreeding, inbreeding, selection techniques, performance testing and evaluating, herd records, indexing and progeny testing. Setting up and organizing improved breeding programs using modern technique and equipment. 3 lectures. Prerequisite: Bio 303.

**A Sci 323 Beef Husbandry (4)**

Purebred cattle business including selection of foundation stock, herd bulls; breeding programs; pedigrees; facilities and equipment; feeding breeding herd, sale cattle, show cattle; marketing purebred cattle; and general management problems. 3 lectures, 1 laboratory. Prerequisite: A Sci 101.

**A Sci 326 Advanced Livestock Evaluation (2)**

Application of deductive and inductive logical processes in appraising the relative merit of individual animals within a group sample. Oral expression of the selection rationale. 2 laboratories. Prerequisite: A Sci 226.

**A Sci 332 Range Technology (4)**

Fundamentals of rangeland survey and inventory. Application of ecology in range evaluation. Analysis of range condition and capacity. Development of plans for effective improvement and utilization of rangeland. 3 lectures, 1 laboratory. Prerequisite: A Sci 229.

**A Sci 333 Horse Husbandry (4)**

Management of the breeding farm. Farm layout. Inheritance, pedigrees, diseases, breeding problems, nutrition, study of estrous cycles, and servicing the mare. Handling stallions. Sale preparation. Breeding and feeding records, office procedure, selection of breeding stock. 3 lectures, 1 laboratory. Prerequisite: A Sci 232.

**A Sci 334 Feed Mill Operation (4)**

Study of general operation of a feed mill including a survey of the industry, buying, storing, grinding, weighing, mixing, packaging, handling, and delivery of formula feeds. Also a study of flow of materials, preventive maintenance and safety in a mill. 3 lectures, 1 laboratory. Prerequisite: A Sci 101.

**A Sci 335 Range Livestock Economics (3)**

Economic structure of the range livestock industry; economics of rangeland use; factors affecting income and costs of range operations; ranchland values; capital and credit for range enterprises; range conservation relationships with ranch operators. 3 lectures. Prerequisite: Junior standing and A Sci 229.

**A Sci 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Prior permission of department head.

**A Sci 401 Reproductive Physiology (4)**

Intensive study of reproductive efficiency of farm animals. Anatomy and physiological factors involved in reproduction. Male and female systems, pregnancy, estrual behavior, semen collection and evaluation, artificial insemination, pregnancy testing, and hormone therapy. 3 lectures, 1 laboratory. Prerequisite: VS 123.

**A Sci 402 Animal Nutrition (4)**

The metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1 laboratory. Prerequisite: A Sci 302, Chem 328.

**A Sci 404 Applied Animal Genetics (3)**

Genetic improvement of economic traits in farm animals. Application of advanced genetic concepts to animal improvements through analysis of performance data. 2 lectures, 1 laboratory. Prerequisite: A Sci 304.

**A Sci 434, 435 Specialized Horse Enterprises (3) (3)**

Early schooling of the young horse through advanced training. Use of the snaffle bit, hackamore, half-breed and Spanish bits. Gentling and ground work. Training in collection, turning, backing, leads, trailer loading, rope work, cattle work. Advanced sign-up with instructor required. 1 lecture, 2 laboratories. Prerequisite: A Sci 333 or appropriate experience.

**A Sci 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**A Sci 463 Undergraduate Seminar (2)**

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

**A Sci 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**A Sci 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**A Sci 580 Seminar in Animal Nutrition (3)**

Current findings and problems in the field of animal nutrition. Effects of new experimental research on the livestock industry. 3 lectures.

**A Sci 581 Graduate Seminar in Animal Production (3)**

Current findings and research problems in the field and their application to the industry. 3 lectures.

## **ANTHROPOLOGY**

**Ant 201 Cultural Anthropology (3)**

The meaning and significance of culture to human beings. Examination of how cultures differ in their impact on behavior. How cultures develop and change. 3 lectures.

**Ant 202 World Prehistory (3)**

The development of human cultures in both the Old and New Worlds from the earliest times until the dawn of history; cultural growth. 3 lectures.

**Ant 203 Physical Anthropology (3)**

Facts and problems of human evolution; fossil man; primate evolution and social behavior; human variation. 3 lectures.

**Ant 301 Development Anthropology (3)**

Application of the basic concepts of anthropology to problems of development. Cross-cultural interaction and culture change using the case-study approach. 3 lectures. Prerequisite: Ant 201 or consent of instructor.

**Ant 310 California Archaeology (3)**

The California Indians; field studies in locating, surveying, and analyzing aboriginal sites; excavation of a site; laboratory techniques for recording, preserving, and reporting of artifacts; relating observations and finds to the natural environment in which a site is located. Integrating knowledge of natural and social sciences to use of archaeology. 2 lectures, 1 laboratory.

**Ant 325 Material Culture (3)**

Description of processes of invention and diffusion. Role of environment and primitive technology on culture. Major preindustrial inventions and their social correlations. 3 lectures. Prerequisite: Ant 201 or consent of instructor.

**Ant 341 Comparative Societies (3)**

Comparative study of contemporary peoples and cultures representing the major cultural types. 3 lectures. Prerequisite: Ant 201.

**Ant 360 Human Cultural Adaptation (3)**

Examination of social and cultural systems as means by which humans adapt to their physical, biotic and social environments. 3 lectures.

**Ant 401 Language and Culture (3)**

Interrelation between language and other facets of culture. Development of linguistic theories as they apply to anthropology from early Indo-European grammarians through current trends. Speech in its social setting. 3 lectures. Prerequisite: Ant 201 or consent of instructor.

**Ant 450 Area Studies (3)**

Comparative analysis of cultures within a selected region (e.g., Southeast Asia, Sub-Saharan Africa etc.). Up to 12 units may be taken. 3 lectures.

## **ARCHITECTURE**

**Arch 106 Materials of Construction (3)**

A description of the numerous building materials, including their application and use in building structures. 3 lectures.

**Arch 202 Creative Problem-Solving (3)**

Techniques for stimulating creative behavior applied to general and environmental problems. Development of problem-solving and decision-making skills and knowledge. 3 lectures.

**Arch 231, 232 Architectural Practice (3) (3)**

Introduction to construction techniques and working drawings. Theory and application of laws and codes affecting buildings. Working drawings as communication instruments. Light timber and heavy timber systems. 3 laboratories. Prerequisite: Arch 106 or consent of school.



**Arch 234 Architectural Practice (6)**

Covers material in Arch 231, 232. Primarily for transfer students. Partial credit may be granted. 6 laboratories. Prerequisite: Arch 106 or consent of school.

**Arch 237, 238 Photographic Presentation (2) (2)**

Photographic and presentation techniques applicable to architectural subjects. For students in the School of Architecture and Environmental Design. 1 lecture, 1 laboratory. Prerequisite: EDes 110, Art 221 or equivalent.

**Arch 240 Additional Architectural Laboratory (1-2)**

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

**Arch 241, 242 Watercolor (1) (1)**

Outdoor sketching with watercolor. 1 laboratory. Prerequisite: Permission of instructor.

**Arch 245 Urban Design in Architecture (3)**

The design role of the urban architect. Economic, environmental and technological forces impacting on architectural practice in urban areas. 3 lectures. Prerequisite: Engl 104.

**Arch 247 Form and Materials (2)**

Design explorations with architectural ceramics, metals, plastics, wood and stone. Total credit limited to 6 units, not more than 2 units in any one quarter. 2 laboratories. Prerequisite: EDes 110, 111.

**Arch 301 History of Non-Western Architecture (3)**

Ancient American, Far Eastern and Central Asian periods of architecture; philosophies and conditions which influenced them. For architects and others. 3 lectures. Prerequisite: Junior standing in the University.

**Arch 308, 309 Building Support Systems (3) (3)**

Environmental systems and equipment available to the architect to make architectural spaces structurally, mechanically and esthetically functional. Engineering and design analysis, system comparisons, cost-benefit studies of building equipment. 3 lectures. Prerequisite: EDes 203, 250, Arch 232.

**Arch 310 Introduction to Systematic Design Methods (3)**

Architectural problem solving by means of systematic design methods. Use of decision making techniques as environmental design aids. 3 lectures. Prerequisite: Second year standing in School of Architecture and Environmental Design or permission of instructor.

**Arch 312 Home and Community Design (3)**

For students not majoring in architecture. Historical development of the home and city and the effect of location, climate, social and technological factors on homes and cities. Considerations and design methodology; furniture, landscape, and relation of home to community environment. 3 lectures.

**Arch 317, 318, 319 History of Architecture (3) (3) (3)**

Periods of architecture; philosophies and conditions which influenced them. 3 lectures. May be taken out of sequence. Prerequisite: Engl 104.

**Arch 341, 342, 343 Architectural Practice (2) (2) (2)**

Construction systems in masonry, steel, and concrete and combinations of these materials. Preparation of outline specifications. Production of design development drawings using preliminary designs of students in coordinated architectural design classes Arch 351, 352, 353. 2 laboratories. Prerequisite: Arch 232, EDes 203. Concurrent: Arch 351, 352, 353.

**Arch 350 Computer Applications in Architecture (2)**

Applications of computer systems to large-scale data processing, analysis, optimization and evaluation of design program elements. 1 lecture, 1 activity. Prerequisite: EDes 250.

**Arch 351, 352, 353 Architectural Design (4) (5) (5)**

Development of logical analysis and creative abilities through application of skills to the solution of architectural problems. 4 or 5 laboratories. Prerequisite: EDes 110, 203, ArcE 223, Arch 232.

**Arch 358 Prefabrication (2)**

History, theory and application of factory fabricated building systems. Materials and techniques, creative design by such methods. 1 lecture, 1 laboratory. Prerequisite: Junior standing.

**Arch 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**Arch 411 Climatic Determinants of Building Design (2)**

Influence of solar radiation and climatic conditions on siting and design of buildings. Architectural principles and energy conservation. 2 lectures. Prerequisite: Phys 132, Arch 309.

**Arch 412 Architectural Acoustics (2)**

Design of architectural spaces for speech communication and music with particular reference to the distribution, absorption and perception of sound. Measurements of sound inside and outside building spaces. Constructional aspects of sound insulation. 1 lecture, 1 laboratory. Prerequisite: Pys 132, EDes 203, Arch 309.

**Arch 413 Architectural Lighting (2)**

Influence of natural and artificial lighting on the design of buildings with particular reference to the Daylight Factor concept, the characteristics of artificial light sources and the combination of natural and artificial light in permanent supplementary artificial lighting installations. 1 lecture, 1 activity. Prerequisite: Arch 308, Phys 133 or 137 and junior standing.

**Arch 441, 442, 443 Professional Practice (2) (2) (2)**

Basic elements of architectural practice. Office organization, procedures, contracts, specifications, construction cost analyses and comprehensive client services. Professional ethics. 2 activities. Prerequisite: Arch 343 and fourth-year standing.

**Arch 446 The Small Scale Master Builder (3)**

Principles of practice as owner-designer-builder, selling or leasing products. Comparison with traditional practice. Potential income, constraints on design decisions, and ethics. Analysis of factors and methods relevant to such practice, including financing, taxes, accounting, market analysis, and development potential. Starting with little or no capital. 3 lectures. Prerequisite: Arch 310.

**Arch 451 Architectural Design (5)**

Continuation of Arch 353. Problems of increasing architectural complexity with emphasis placed on comprehensive solutions. 5 laboratories. 15 units required, no more than 5 units per quarter. Prerequisite: Arch 308, 309, 343, 353, ArcE 321, 322, 323.

**Arch 458 Computer Graphics Applications in Architecture (2)**

Computer graphics techniques as they relate to applications in working drawings and design. 2 activities. Prerequisite: Math 143, EDes 250.

**Arch 461, 462 Senior Project (2) (2)**

Selection and completion of a comprehensive type project under faculty supervision. Problems will involve students' technical and creative skills. Construction encouraged. To be completed in two consecutive quarters. 120 hours minimum total time. Credit/No Credit grading only. Prerequisite: Arch 353.

**Arch 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Arch 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

**Arch 501 Environmental Control Systems (3)**

Comparative analysis and evaluation of mechanical and electrical building systems in high-rise and special purpose low-rise buildings. 3 seminars. Prerequisite: graduate standing or consent of instructor.

**Arch 502 Building Construction and Performance (3)**

Comparative analysis of the performance of selected systems of building construction with particular emphasis on nonstructural functions. 3 seminars. Prerequisite: graduate standing or consent of instructor.

**Arch 510, 511 Systematic Design Methods (3) (3)**

Application of systematic, step-by-step procedures to rational and intuitive judgmental tasks. Methods for formulation, idea production, evaluation, and testing applied to planning, testing, design information systems, communication between designer and client, user participation in design, and other current topics. 3 lectures. Prerequisite: graduate standing or consent of instructor.

**Arch 531 Habitability (3)**

Habitability standards and concepts significant for architectural design and practice. Behavioral analysis of habitats, facilities and urban systems. Design and development of structures and systems responsive to human needs. Habitability and environmental specifications, human factors, human engineering, behavioral sciences. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**Arch 532 Environmental Research and Development (3)**

Roles of research in environmental design analysis. Approaches to research, hypothesis testing, data banks, and information systems for design. Use of research findings in various decision-making systems. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**Arch 533 Architectural Programming (3)**

Fundamentals of professional process as prescribed by law and ethics. Product design as determined by architectural implications of user needs and building systems. A search for parameters. 3 seminars. Prerequisite: graduate standing or consent of instructor.

**Arch 540 Environmental and Regulatory Agencies (3)**

Regulatory agencies and environmental laws. Parameters limiting to the design professions. Comparisons of project proposals with environmental acceptance. 3 seminars. Prerequisite: graduate standing or consent of instructor.

**Arch 551 Architectural Design (6)**

Professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the total environment. Building types considered as the coordinating factor. Total credit limited to 12 units with not more than 6 units in any one quarter. 6 laboratories. Prerequisite: Graduate standing.

**Arch 561 Advanced Design (6)**

Continuation of Arch 551. Advanced studies integrating architectural design theory and practice with fields influencing the shaping of the total environment. 12 units required, no more than 6 units per quarter. 6 laboratories.

**Arch 563 Professional Seminar (2)**

Problems and topics in the field of the architectural profession. Seminar drawn upon expertise of visiting professionals in addition to topics presented by regular faculty and students. 2 meetings. Prerequisite: Graduate standing.

**Arch 580 Seminar in Theory of Architecture (3)**

Directed group study of selected topics in the theory of architecture for graduate students. Class schedule will list specific topics selected. May be repeated to 9 units. 3 meetings. Prerequisite: Consent of instructor.

**Arch 590 Seminar in Design Analysis (3)**

Directed group study of methods of analysis of architectural subjects. Class schedule will list specific area of focus. May be repeated to 9 units. 3 meetings. Prerequisite: Consent of instructor.

**Arch 599 Thesis Project (2) (7)**

Completion of a project embodying original research and/or demonstrating individual creative ability in an area of environmental design. Prerequisite: Consent of graduate adviser, consent of graduate committee and Adv Design 561 (12 units).

## **ARCHITECTURAL ENGINEERING**

**ArcE 221, 222, 223 Structures (3) (3) (3)**

Forces on building structures. Statics and stability of structural systems. Physical properties. Derivation and development of stress-strain relationships and deflection theory. Analysis and synthesis of structural systems in the design process. 3 lectures. Prerequisite: Phys 131, Math 142.

**ArcE 224 Structures (3-9)**

Forces on building structures. Statics and stability of structural systems. Physical properties. Derivation and development of stress-strain relationships and deflection theory. Analysis and synthesis of structural systems in the design process. 3-9 lectures. Prerequisite: Phys 131, Math 142.

**ArcE 240 Additional Engineering Laboratory (1-2)**

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

**ArcE 301 Stress Analysis Laboratory (1)**

Test and analysis of structural materials. Analysis using strain gauges. Displacement measurements and photoelastic methods. 1 laboratory. Prerequisite: ArcE 223 or concurrent.

**ArcE 302 Timber Design (3)**

Analysis and design of timber structures subject to gravity and lateral loads with emphasis upon the detailed design of members and connections. 3 lectures. Prerequisite: concurrent enrollment in ArcE 361.

**ArcE 303 Steel Design (3)**

Analysis and design of steel structures subject to gravity and lateral loads with emphasis upon the detailed design of members and connections. 3 lectures. Prerequisite: concurrent enrollment in ArcE 362.

**ArcE 304 Structural Analysis (3)**

Analysis of statically determinate and indeterminate structures. Introduction to the principles of work-energy. 3 lectures. Prerequisite: EDes 250, ArcE 362. Concurrent enrollment in ArcE 363 required.

**ArcE 311 Structures for Landscape Architects (3)**

Basic principles of structures and design of landscape structures. 3 lectures. Prerequisite: LA 231.

**ArcE 321, 322, 323 Structures (3) (3) (3)**

Analysis and design of steel, timber, masonry and concrete structures for gravity and lateral loads. Limitations and potentials of the materials in relation to the design and construction process. For architecture and construction students. May be taken out of sequence. 3 lectures. Prerequisite: Arch 232, ArcE 223.

**ArcE 361, 362, 363 Design Analysis for Engineers (4) (4) (4)**

Studies in building design, development of the structural concept based upon function, aesthetics, structural efficiency and code requirements. Methods of joinery and working drawings in masonry, timber and steel. 4 laboratories. Prerequisite: Arch 232, ArcE 223, EDes 203. Concurrent series enrollment in ArcE 302, 303, 304 required.

**ArcE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ArcE 409 Survey of Foundation Engineering (3)**

Fundamentals of foundation engineering, evaluation of soil reports, principles of determination of bearing capacity, soil classification, selection of types of foundations, evaluation of expansive properties of foundation soils, discussion of basic laboratory tests. 3 lectures. Prerequisite: ArcE 223.

**ArcE 411 Matrix Analysis of Structures (3)**

Analysis of statically indeterminate structures by force and displacement methods, including programming for digital computer applications to beams, rigid frames, plane and space trusses, and other structures. 3 lectures. Prerequisite: ArcE 304.

**ArcE 412 Dynamics of Framed Structures (3)**

Analysis of structures subjected to dynamic loads with single- and multi-degrees of freedom. Development of techniques for analysis of structures in response to seismic, wind, and moving loads. Solution of problems by digital computer. 3 lectures. Prerequisite: ArcE 445, 483, Math 242.

**ArcE 414 Precast Concrete (3)**

Precast and prestressed concrete principles, materials and techniques of construction. Concrete mixes, forming, casting, finishing, curing and erection methods of precast concrete. Design potentials, aesthetics, cost and construction time as related to buildings and other structures. 3 lectures. Prerequisite: ArcE 323 or 444.

**ArcE 415 Concrete Testing Laboratory (1)**

Study of concrete mix design, physical properties of concrete, use of admixtures, concrete batching, concrete curing, testing of concrete and concrete specifications. Includes mix design, batching and physical testing of the designed mixes. 1 laboratory. Prerequisite: ArcE 323 or 304.

**ArcE 421 Soil Mechanics (3)**

Principles of soil mechanics, including rudiments of geology, soil classification, gravimetric and volumetric relations, compaction, methods and testing, shear strength of soil and strength theories. 2 lectures, 1 laboratory. Prerequisite: Math 241, Geol 201 or consent of instructor.

**ArcE 422 Foundation Design (3)**

Soil-bearing capacity and settlement characteristics of soils. Sizing and design of spread footings. Design and analysis of earth-retaining structures. 2 lectures, 1 laboratory. Prerequisite: ArcE 421.

**ArcE 423 Advanced Foundation Design (3)**

Design and analysis of beams on elastic foundations and mat foundations utilizing conventional and finite difference methods. Pile foundations and sheet pile retaining structures. Emphasis placed upon computer solutions. 2 lectures, 1 laboratory. Prerequisite: ArcE 422.

**ArcE 431, 432, 433 Design Analysis for Engineers (2) (3) (2)**

Design analysis of Architectural Engineering structures including problems in the application of thermodynamics, fluid statics, dynamics, flow in pipes and open channels, specifications, contracts, engineering economics, and engineering studies including feasibility and alternate problem analysis. 2 or 3 activities. Prerequisite: ArcE 363.

**ArcE 444 Structural Design (5)**

Design of reinforced concrete structures. Theory and application to building structural systems. 5 laboratories. Prerequisite: ArcE 301, 304 and 363.

**ArcE 445 Structural Design (5)**

Design and analysis of complex structures with application to multi-story buildings and bridge structures. Design and analysis of prestress concrete structures. Application of digital computers. 5 laboratories. Prerequisite: ArcE 444.

**ArcE 446 Structural Design (5)**

Selected advanced topics with application to structures curved in space. Shells, arches and cables. 5 laboratories. Prerequisite: ArcE 445.

**ArcE 461, 462 Senior Project (2) (2)**

Selection and completion of a comprehensive type project under faculty supervision. Problems to involve the students' technical and creative skills. Construction encouraged. To be completed in two consecutive quarters. 120 hours minimum total time. Prerequisite: ArcE 363.

**ArcE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**ArcE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

**ArcE 481, 482 Advanced Materials Testing Laboratory (1) (1)**

Advanced laboratory work in testing and analysis of structural materials, structural components and structural systems subject to static and seismic forces in the elastic and inelastic ranges. Scaled and non-scaled models in timber, steel, concrete and plastics. 1 laboratory. Prerequisite: ArcE 301 and 304 or 323.

**ArcE 483 Seismic Design (3)**

Introduction to dynamic response analysis of building structures with emphasis on earthquake ground motion. Earthquake resistant design of buildings in accordance with building codes. Application of computer programs and physical models for seismic design. 3 lectures. Prerequisite: ArcE 411.

#### **ArcE 504 Finite Element Method for Building Structures (3)**

Basic concepts of equilibrium and compatibility; stiffness and flexibility properties of various types of finite elements. Development and application of displacement and force methods. Elastic stability and dynamic response of buildings to earthquake, wind, and moving loads. Use of finite-element computer programs. 3 lectures. Prerequisite: Math 242, ArcE 411, or permission of instructor.

### **ART**

#### **Art 101 Fundamentals of Drawing (3)**

Analysis and practice in functional drawing, basic design, and study of form. Development of individual techniques. 3 activity periods.

#### **Art 104 Introduction to Art Materials (3)**

Manipulation and experimentation with a wide variety of art media and techniques. Evaluation of expressive and design qualities in group and individual projects. 3 activity periods.

#### **Art 111 Introduction to Art (3)**

Designed to further understanding of painting, sculpture and graphic arts. Development of vocabulary and useful criteria for evaluation. 3 lectures.

#### **Art 121 Introduction to Photography (2)**

A non-laboratory course on the basics of B/W photography for the individual who wishes to improve photographic technique. Cameras, camera handling, films, composition, lighting, and camera accessories. 2 lectures.

#### **Art 141 Introduction to Crafts (3)**

Basic experiences in three-dimensional processes in contemporary crafts with clay, metal, wood and other materials. Creative statement and development of personal design concepts. 3 activity periods.

#### **Art 145 Ceramics Handbuilding (3)**

Handbuilding techniques, including slab, coil, pinch, press and other forms. Emphasis on skill development and personal creative statement. 3 activities.

#### **Art 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

#### **Art 201 Intermediate Drawing (3)**

Development of additional drawing techniques with emphasis on form and composition. 3 activities. Prerequisite: Art 101.

#### **Art 204 Beginning Watercolor (3)**

Transparent watercolor painting. Course emphases: proper use of watercolor paper, brush techniques, pigment mixing, use of color, use of washes, wet-into-wet, indirect methods, composition and presentation. 3 activities. Prerequisite: Art 101.

#### **Art 207 Printmaking (3)**

Major intaglio processes for fine art prints. Technical surveys, expressive principles, history, and production. 3 activities. Prerequisite: Art 101, 104 or consent of instructor.

#### **Art 208 Sculpture (3)**

Elements of three dimensional form through the exploration of sculptural techniques. Problems in modeling, casting, carving and techniques of assembly. 3 activities.

#### **Art 211 Art History—Prehistoric through Roman (4)**

Analytical and chronological study of significant art and artists in western civilization. Emphasis upon painting, sculpture and related visual arts. 4 lectures.

**Art 212 Art History—European Medieval Art (4)**

Major forms of art expression from the Early Christian through Gothic Eras. 4 lectures.

**Art 213 Art History—Renaissance through Baroque (4)**

Analytical and chronological study of significant art and artists in the development of western civilization. Emphasis upon painting, sculpture, and the related visual arts. 4 lectures.

**Art 221 Basic B/W Photography (3)**

Fundamental techniques in black and white photography. Mechanics of cameras and equipment, optics, composition, filters, subject content, developing, printing, and mounting. Understanding photographic principles, producing a quality continuous tone print, and print presentation. 2 lectures, 1 laboratory.

**Art 224 Advanced B/W Photography (3)**

Advanced black and white photography. Small format cameras, sensitometry, studio, strobe, available light, developing, printing, black and white transparencies, retouching, copying and visual communication of facts and ideas. 2 lectures, 1 laboratory. Prerequisite: Art 221 or consent of instructor.

**Art 226 Large Format Photography (3)**

Advanced techniques in black and white photography using large format cameras. View camera techniques for studio, macro, interior and exterior architectural structures and commercial application. 2 lectures, 1 laboratory. Prerequisite: Art 221.

**Art 228 35mm Color Slide Photography (2)**

Introductory nonlaboratory course in color slide photography featuring 35mm camera handling, slide film, indoor and outdoor photography, composition, slide presentation. 2 lectures.

**Art 231, 232, 233 Design Fundamentals (3) (3) (3)**

Exploration of basic graphic theory and practice. Two-dimensional concepts, three-dimensional concepts, and color concepts introduced in sequence. 3 activities.

**Art 234 Functions of Design (3)**

Survey of design in areas pertinent to the environment; lecture-discussion related to current design trends. Involvement of the individual in the environment. 3 lectures.

**Art 235 Illustration (3)**

Development of drawing skills necessary for the rendering of editorial and advertising illustration. Brief historical survey of illustration, research, and conceptual development of illustration. 3 activities. Prerequisite: Art 101 or consent of instructor.

**Art 236 Calligraphy and Letterforms (3)**

Development of the fundamental dextral skills necessary for accurate rendering of historic and contemporary letterforms. Development of visual skills necessary to sensitively space letterforms together to form words, sentences, and paragraphs. 3 activities.

**Art 242 Glassblowing (3)**

Techniques in offhand glassblowing leading toward individual creative statement through mastery of fine craftsmanship. Design, history, forming processes, and development of tools and equipment. 3 activities. Prerequisite: Art 141 or consent of instructor.

**Art 245 Ceramics (3)**

Ceramic processes with emphasis on design, hand building, and use of the potter's wheel. 3 activities. Prerequisite: Art 101, 233 and 234 or consent of instructor.

**Art 250 Wood Design (3)**

Development of design concepts in wood using sketches and drawings as the conceptual medium. Familiarization with basic wood and tool processes. Design and execution of a small project expected. 3 activities. Prerequisite: Art 101, 233 and 234 or consent of instructor.



**Art 255 Metalsmithing (3)**

Nonferrous metal techniques including cutting, forming, soldering, and forging with emphasis on design and craftsmanship. 3 activities. Prerequisite: Art 101, 233 and 234 or consent of instructor.

**Art 301, 302 Advanced Drawing (3) (3)**

Development of advanced methods and techniques in the study of form and structure. Emphasis on problem solving. 3 activities. Prerequisite: Art 101, 231.

**Art 303 Life Drawing (3)**

Advanced problems in life drawing. Development of advanced methods and techniques in the study of form and structure. 3 activities. Prerequisite: Art 201.

**Art 304 Advanced Watercolor (3)**

Transparent watercolor painting. Design and composition of painting, use of drawing and advanced watercolor techniques. 3 activities. Prerequisite: Art 204.

**Art 305 Painting Techniques (3)**

Physical characteristics of painting media, creative understanding of pictorial space and color: 3 activities. Prerequisite: Art 101, or consent of instructor.

**Art 307 Printmaking (3)**

Contemporary and traditional printmaking techniques. Application of two-dimensional concepts to original prints. 3 activities. Prerequisites: Art 101, 207 or consent of instructor.

**Art 308 Sculpture (3)**

Continuing exploration of three-dimensional form through sculptural techniques. Advanced problems in modeling, casting, carving, and techniques of assembly. 3 activities. Prerequisite: Art 208 or consent of instructor.

**Art 311 Development of Modern Art (3)**

Traces the major art movements and modes of visual expression from the mid-19th century to World War I. 3 lectures. Prerequisite: Art 111 or consent of instructor.

**Art 312 Contemporary Art (4)**

Studies 20th century art from World War I to the present. Emphasis upon major terms of visual expression in the age of science and technology. 4 lectures.

**Art 314 History of Crafts (3)**

Survey of craftsmen and craft movements of the modern era with emphasis on the twentieth century. 3 lectures. Prerequisite: Art 213, 312 or consent of instructor.

**Art 322 Color Photography (3)**

Fundamental techniques in color photography. Theory of color, exposing, and processing color negatives, 35mm and 4 x 5 transparencies, color printing, finishing and presentation. Studio electronic flash and available light. 2 lectures, 1 laboratory. Prerequisite: Art 224 or consent of instructor.

**Art 331, 332, 333 Graphic Design (3) (3) (3)**

Investigation and experimentation in art structure, color and design. Relation of aesthetic concepts to practical two and three dimensional problems in advertising, packaging, display and exhibits. Lettering skill will be emphasized. 3 laboratories. Prerequisite: Art 233 or permission of the instructor.

**Art 336 Display and Exhibition Design (2)**

Applied principles of handling materials for display and design of exhibitions. Actual gallery experience including planning, publicity, and set-up of shows. 1 lecture, 1 laboratory.

**Art 341 Multiple Processes in Crafts (4)**

Production methods for studio or industrial craftsman with consideration to design integrity, material use and product acceptance. Each schedule listing will have an area and topic subtitle. 2 lectures, 2 activities. Prerequisite: Art 141, Art 300 level in same area or consent of instructor.

**Art 342 Glass Fabrication (3)**

Techniques in moderate energy forming, chemistry, stained glass, pate de verre, etching, polishing, and engraving to further the development of glass skills leading to a greater understanding of glass and its aesthetic potential. 3 activities. Prerequisite: Art 242 or consent of instructor.

**Art 345 Ceramics (3)**

Ceramic materials and processes; design, slab, coil and wheel forming, glazing. Related instruction and evaluation. Total credit limited to 6 units. 3 activities. Prerequisite: Art 245 or consent of instructor.

**Art 349 Ceramic Glazes (3)**

Historical background, chemistry review, raw materials, colorants, glaze calculations, construction of test tiles, techniques of glaze application and firing. Emphasis on notebooks; written and oral presentation of final project. Total credit limited to 6 units. 3 activities. Prerequisite: Chem 106 and Art 245 or consent of instructor.

**Art 350 Wood Design (3)**

Development of design skills, wood, and tool processes. Advanced joinery and construction methods such as dovetailing, formed laminates, stacking and formed plywood techniques will be developed. Individual design statement expected. 3 activities. Prerequisite: Art 250.

**Art 351 Wood Design (3)**

Continued development of design skills, wood and tool processes. Advanced joinery and construction methods such as dovetailing, formed laminates, stacking and formed plywood techniques will be developed. Individual design statement expected. 3 activities. Prerequisite: Art 250

**Art 355 Metalsmithing (3)**

Investigation of surface design techniques for nonferrous metals including etching, chasing-repoussé, mokume, inlay, and various texturing processes. 3 activities. Prerequisite: Art 255 or consent of instructor.

**Art 356 Metalsmithing (3)**

Introduction to casting for the jeweler with emphasis on lost wax techniques including design, wax working, casting and finishing. 3 activities. Prerequisite: Art 255 or consent of instructor.

**Art 381 Professional Practice in Art (2)**

Professional practices in the art and design field, legal and ethical questions, taxes, contracts, fees and copyrights. Current job opportunities, resume and portfolio preparation with visiting professionals. 2 activities. Prerequisite: Advanced standing in major or consent of the instructor.

**Art 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing and consent of instructor.

**Art 422 Creative B/W Photography (4)**

Based upon black and white advanced techniques. High contrast, solarization, bas-relief, tone line, texture screens, other abstract techniques. Emphasis placed on creative self-expression, application of techniques to give greater visual impact. 2 lectures, 2 laboratories. Prerequisite: Art 224.

**Art 424 Multi-Media/Creative Color Photography (4)**

Multi-media presentation, synchronizing creative color slides, music and narration. Contemporary, creative photography techniques applied. Creative seeing, self-expression and interpretation that communicates to the viewer. 2 lectures, 2 laboratories. Prerequisite: Art 322 or consent of instructor.

**Art 426 Illustration Photography (3)**

Principles of lighting and design as applied to subjects and small product studio photography. Creative problem solving, constructing scene and lighting to produce quality image. 2 lectures, 1 laboratory. Prerequisite: Art 221, 224 and 226.

**Art 431, 432, 433 Advanced Graphic Design (3) (3) (3)**

Laboratory problems in practical advertising design with emphasis on mass media, page layout, and related areas. Contemporary trends in graphic design. 3 laboratories. Prerequisite: Art 333 or permission of the instructor.

**Art 445, 446, 447 Ceramics (3) (3) (3)**

Advanced clay construction, decoration, glazing and firing with emphasis on the use of the potter's wheel. Development of personal design philosophies and ceramic theory as a basis for criticism. Emphasis on plate, bowl, cylindrical, bottle, and combined forms. 3 activities. Prerequisite: Art 345 or consent of instructor.

**Art 450, 451, 452 Wood Design (3) (3) (3)**

Advanced design concepts presented as expected from a professional designer. Development of skills at a high level of competency. 3 activities. Prerequisite: Art 351.

**Art 455, 456, 457 Metalsmithing (3) (3) (3)**

Exploration of techniques used in creating holloware forms with emphasis on raising. Development of skills used in the creation of limited production jewelry forms. 3 activities. Prerequisite: Art 355, 356 or consent of instructor.

**Art 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Minimum of 120 hours time. Results presented in a formal report. Prerequisite: Senior standing.

**Art 463 Undergraduate Seminar (2)**

Analysis of selected problems and topics for undergraduates. Prerequisite: Senior standing.

**Art 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Art 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**Art 481 Studio Practices (3)**

Problems and topics dealing with the practical aspects of establishing and maintaining a professional design studio. 2 lectures, 1 activity. Prerequisite: Art 300-400 level courses totaling 9 units, Art 381, or consent of instructor.

**Art 482 Crafts Design/Production (5)**

Design development and production of a series or edition of craft objects, after analysis of crafts history, esthetics, function, materials, processes and costs. 5 activities. Prerequisite: Senior standing and consent of instructor.

#### **Art 483 Crafts Marketing (2)**

Production costs, exhibitions and sales practices, appropriate and effective exposure and marketing of craft productions. Final evaluation reports include financial accounting and suggestions for improving design, production and marketing. 2 activities. Prerequisite: Art 482 or consent of instructor.

### **ASTRONOMY AND ASTROPHYSICS**

#### **Astr 101 Introduction to the Solar System (3)**

Descriptive astronomical properties of the earth, moon, other planets and their satellites. Comets, asteroids and other members of the solar system. Theories of the formation of the solar system. Opportunities for telescope observations of the moon and planets. Not open to students who have completed or are taking Astr 301, 302 or Phys 132. 3 lectures.

#### **Astr 102 Introduction to Stars and Galaxies (3)**

Descriptive astronomical properties of the sun, stars, galaxies, and interstellar material. The expanding universe and cosmological models. Opportunities for telescope observations and star identification. Not open to students who have completed or are taking Astr 301, 302, or Phys 132. Astr 101 is not a prerequisite. 3 lectures.

#### **Astr 301 The Solar System (3)**

Quantitative and descriptive properties of the solar system including the physics of the planets, their satellites, comets and interplanetary media; possible origins of the solar system. 3 lectures. Prerequisite: Phys 132 or 123.

#### **Astr 302 Stars and Galaxies (3)**

Quantitative and descriptive properties of the stars, galaxies and interstellar media; including stellar structure and evolution, structure and make-up of galaxies and cosmological models. 3 lectures. Prerequisite: Phys 132 or 123. Astr 301 is not a prerequisite.

#### **Astr 303 Cosmology and General Relativity (3)**

Introduction to the basic ideas of general relativity. Einstein's law of gravity, curved space and its application to relativistic models of the universe, black holes, and pulsars. Big Bang and Steady State theories of the expanding universe. Relevant observational evidence included. 3 lectures. Astr 302 is not a prerequisite. Prerequisite: Phys 133.

#### **Astr 351 Observational Astronomy (1)**

Practical observing experience using stellar coordinate systems to locate and photograph celestial objects with the telescope. Topics of observational interest such as the lunar surface, planetary orbits, stellar magnitudes and stellar classification. 1 laboratory. Prerequisite or concurrent. Astr 301 or 302 or consent of instructor.

### **BACTERIOLOGY**

#### **Bact 221 General Bacteriology (4)**

Morphology, metabolism, classification and identification; bacteriology of air, soil, water, and foods with applications to industry, agriculture, medicine, and public health. 2 lectures, 2 laboratories. Prerequisite: One quarter of college chemistry and Bot 121 or Zoo 131.

#### **Bact 224 General Microbiology (4)**

Functional anatomy, physiology, and genetics of microorganisms. 2 lectures, 2 laboratories. Prerequisite: Bot 121 or Zoo 131 and organic chemistry (or equivalent).

#### **Bact 225 General Microbiology (4)**

Systematics and ecology of microorganisms with emphasis on procaryots; a survey of the microbial groups. 2 lectures, 2 laboratories. Prerequisite: Bact 224.

**Bact 322 Dairy Bacteriology (4)**

Advanced course for practical work demonstrating the domestic and industrial importance of microorganisms involved in milk and dairy products; milk, milk powders, fermented milks, evaporated and condensed milks, butter, cheese, cheese starters, and ice cream. 2 lectures, 2 laboratories. Prerequisite: Bact 221 or Bact 224.

**Bact 333 Industrial Microbiology (4)**

Industrial application of microorganisms in the production of chemicals related to the food and pharmaceutical industries; consideration of environmental sanitation in industrial processes. 2 lectures, 2 laboratories. Prerequisite: Bact 221 or Bact 224, Chem 226.

**Bact 342 Sanitary Microbiology (4)**

Principles of disease prevention and control. Water-, food-, and air-borne microbial contaminations and epidemiology of ensuing diseases. Laboratory techniques in detection and control of wastes and disease-causing microorganisms. 2 lectures, 2 laboratories. Prerequisite: Bact 221 or 224.

**Bact 402 General Virology (3)**

Virus-host interactions. Structure and function of viruses as obligate intracellular parasites of microbes, plants, and animals. Epidemiology, pathogenesis, prophylaxis, chemotherapy, and manipulation of viruses which parasitize man. 3 lectures. Prerequisite: Bact 224. Recommended: One quarter of college biochemistry.

**Bact 403 General Virology Laboratory (2)**

Methods of culture, characterization and identification of viruses, with emphasis on viruses parasitic in man and animals. 2 laboratories. Prerequisite or concurrent: Bact 402 and consent of instructor.

**Bact 421 Food Microbiology (4)**

Physiological activities of microorganisms involved in the preparation, preservation, deterioration and toxicity of foods and related products. Sanitary and public health implications. 2 lectures, 2 laboratories. Prerequisite: Bact 221 or Bact 224. Recommended: Chem 226.

**Bact 423 Medical Microbiology (4)**

Microorganisms as agents of disease in man. Epidemiology, host-parasite relationships, and principles and procedures for laboratory diagnosis of human diseases. 2 lectures, 2 laboratories. Prerequisite: Bact 225. Recommended: Zoo 426.

**Bact 424 Bacterial Cytology and Physiology (4)**

Cellular structure and life processes of bacteria; chemical composition, growth and metabolism. General biological implications. 3 lectures, 1 laboratory. Prerequisite: Bact 225 and Chem 226. Recommended: one quarter of biochemistry.

**Bact 430 Medical Mycology (4)**

Morphology, physiology, infectivity, and immunogenicity of fungi pathogenic for man and other mammals. Host-parasite interactions. Demonstration and isolation of pathogenic fungi from clinical material. 2 lectures, 2 laboratories. Prerequisite: Bact 423.

**Bact 436 Microbial Ecology (4)**

Distribution and interrelationships of marine, fresh water, and terrestrial protists. Microorganisms as biological, biochemical, and geological agents and the role they play in the cycles of nature. 2 lectures, 2 laboratories. Prerequisite: Bact 221 or 224.

## **BIOLOGY**

**Bio 099 Agricultural Biology (3)**

Basic biological principles applied to agriculture. This course may not be substituted for General Zoology or General Botany. 2 lectures, 1 demonstration and discussion hour. Not open to degree students for degree credit.

**Bio 101 General Biology (3)**

Principles of cellular biology, heredity, ecology, and evolution, with emphasis on their relationship to human affairs. Not open to students who have completed Bot 121 or Zoo 131. 3 lectures.

**Bio 102 Plant Biology (3)**

Structural and functional aspects of plants, with emphasis on seed producers. Not open to students who have completed Bot 121. 3 lectures. Prerequisite: Bio 101.

**Bio 103 Animal Biology (3)**

Structural and functional aspects of animals, with emphasis on man. Not open to students who have completed Zoo 131. 3 lectures. Prerequisite: Bio 101.

**Bio 127 Natural History (3)**

Scope of natural history; formation and identification of features in the physical environment; natural history survey of arachnids, myriapods, and insects. 1 lecture, 2 laboratories.

**Bio 128 Natural History (3)**

Natural history survey of the plant and animal kingdom; field study and identification of marine intertidal organisms. 1 lecture, 2 laboratories.

**Bio 129 Natural History (3)**

Principles of field biology and ecology; laboratory and field study of wildflowers, land communities, and freshwater communities; emphasis is on California natural history. 1 lecture, 2 laboratories. Prerequisite: Bio 128.

**Bio 253 Orientation to the Health Professions (1)**

Participation in hospital activities and mental health services. Intended for medically oriented students. Total credit limited to 6 units with a maximum of 1 unit per quarter. Offered only on Credit-No Credit basis. 1 activity. Prerequisite: Instructor's consent and one quarter of college chemistry and Zoo 131.

**Bio 255 Microtechnique (2)**

Methods of preparing plant and animal tissues for microscopic study with emphasis on paraffin embedding techniques and staining. 2 laboratories. Prerequisite: Bot 122 or Zoo 132.

**Bio 301 Human Ecology (3)**

Examination of the ways in which man is dependent on his environment, his ability to modify it, and the results of such modification. 3 lectures. Prerequisite: One quarter of biological science.

**Bio 302 Human Inheritance (3)**

Basic principles of human inheritance. Transmission of genetic traits, chromosomal anomalies of humans, gene action, mutations and mutagenic agents, eugenics, and principles of genetic counseling. 3 lectures. Prerequisite: One course in college biology (preferably Bio 101 or Zoo 131).

**Bio 303 Genetics (3)**

Principles of heredity and variation. 3 lectures. Prerequisite: one quarter of college biology and one quarter of college mathematics.

**Bio 304 Molecular Genetics (2)**

Introduction to the structures, functions, and regulatory mechanisms of nucleic acids in biological systems. 2 lectures. Prerequisite: One quarter of college biology. Recommended: Bio 303 and one course in biochemistry.

**Bio 311 Radiation Biology (3)**

Review of production and characteristics of non-ionizing and ionizing radiation; interaction and effect of radiation on living cells, tissues, organs, and organisms; introduction to use of radioisotopes; radiation protection and dosimetry; impact of nuclear energy on the biological world. 3 lectures. Prerequisite: Chem 122 or 128 and one of the following: Bio 101, Bot 121, Zoo 131.

**Bio 315 Evolution (3)**

Modern concepts of evolutionary mechanisms. 3 lectures. Prerequisite: Bio 303.

**Bio 321 Biological Instrumentation (3)**

Theory and operation of instruments commonly used in biological investigation. 1 lecture, 2 laboratories. Prerequisite: Bot 121, Zoo 131 or Bio 129.

**Bio 325 General Ecology (3)**

Study of the interrelationships between plants and animals and their environment in terrestrial, marine, and freshwater situations. 2 lectures, 1 laboratory. Prerequisite: Bio 129 or both Bot 122 and Zoo 132.

**Bio 328 Marine Biology (4)**

Biological and environmental studies of marine organisms, with emphasis on their economic importance. 2 lectures, 2 laboratories. Prerequisite: Bio 129 or both Bot 122 and Zoo 133, or consent of instructor.

**Bio 334 Freshwater Ecology (3)**

Physical, chemical, and biological factors of freshwater environments as they relate to freshwater organisms. 2 lectures, 1 laboratory. Prerequisite: one year college biology, one quarter college chemistry.

**Bio 342 Computer Applications in Biology (3)**

Application, use and simple modification of computer programs for biological studies. 2 lectures, 1 laboratory. Prerequisite: Junior standing, completion of mathematics requirement, and CSc 101 or CSc 110.

**Bio 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

**Bio 415 Biogeography (3)**

Study of plant and animal distribution patterns in relation to past and present physical and biotic factors; continent by continent survey of biogeography with major emphasis on North America. 3 lectures. Prerequisite: Bio 325.

**Bio 423 General Cytology (4)**

Detailed study of the structure and function of animal and plant cells. 3 lectures, 1 laboratory. Prerequisite: Zoo 131 and Bot 121 and organic chemistry or biochemistry.

**Bio 424 Organizing and Teaching Biological Sciences (3)**

Objectives, content, techniques, material, and recent trends of successful instruction in secondary school biology. 3 lectures. Prerequisite: Evidence of satisfactory preparation in biology, botany, and zoology.

**Bio 425 Basic Electron Microscopy I (3)**

Biological applications of electron microscopy including techniques of specimen preparation, design of experiments, interpretation of results and limitations. 1 lecture, 2 laboratories. Prerequisite: Zoo 131, Bot 121, Bio 423 or consent of instructor.

**Bio 431 Physiology I: General (4)**

The functioning, control, and integration of physiological phenomena at various levels from cell to organism. 2 lectures, 2 laboratories. Prerequisite: Chem 226; Bot 122 or Zoo 132.

**Bio 437 Marine Resources (3)**

Resource status of present and potential biological marine resources of the sea. Identification, life history, ecology, culture and economics of pertinent organisms. 3 lectures. Prerequisite: Bot 122 and Zoo 133.

**Bio 442 Biometry (4)**

Design of biological experiments with emphasis on sampling methods, data collection, mensuration, and analysis of field and laboratory data. 3 lectures, 1 laboratory. Prerequisite: One year of biology and Stat 212 or 321.

**Bio 461, 462 Senior Project (2) (2)**

Projects are selected from typical problems which graduates may meet in areas of their future employment. Results are presented in both oral and written reports. Minimum 120 hours total time.

**Bio 463 Undergraduate Seminar (2)**

Study and discussion of recent developments in the field of biology. 2 meetings. Prerequisite: Senior standing.

**Bio 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Bio 471 Selected Advanced Laboratory (1-2)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topics selected. Total credit limited to 4 units. 1 to 2 laboratories. Prerequisite: Consent of instructor.

**Bio 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Graduate standing and consent of department head.

**Bio 515 History of Biology (3)**

Critical survey of the historical development of experimental designs for the solution of biological problems. 3 lectures. Prerequisite: Graduate standing.

**Bio 524 Developmental Biology (3)**

Developmental phenomena of higher and lower plants, vertebrate and invertebrate animals at the molecular, cellular, histological and organ levels. Each quarter will emphasize a different biological description. 3 units per quarter. May be repeated to a maximum of 9 units. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology.

**Bio 527 Cell Physiology (4)**

Functional organization of cells, their environment, and energy metabolism. Laboratory exercises in dynamic aspects of cell physiology. 2 lectures, 2 laboratories. Prerequisite: Graduate standing and Chem 328, Math 118, Bio 431.

**Bio 530 Toxicology (3)**

Toxicology of natural products, drugs, and chemicals; environmental, economic, and forensic aspects. 3 lectures. Prerequisite: Graduate status, Chem 328 and Bio 431 or their equivalents.



**Bio 542 Multivariate Biometry (4)**

Design of biological experiments involving multivariate observations. Experimental design, sampling, computer analysis, and interpretation of results. 3 lectures, 1 laboratory. Prerequisite: Stat 313, Bio 442.

**Bio 543 Morphometrics (3)**

Biological phenomena from problem definition and field collection of data through multivariate analysis of data and presentation of results. 2 lectures, 1 laboratory, 2-4 weekend field trips. Prerequisite: Bio 542.

**Bio 570 Selected Topics in Biology (1-3)**

Directed group study of selected topics for graduate students. Class schedule will list topics for selection. Topic credit limited to 9 units. 1 to 3 lectures. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology.

**Bio 590 Seminar in Biology (1)**

Problems and topics in advanced biology selected according to the interest and needs of the students enrolled. Maximum of 5 units. 1 activity. Prerequisite: Graduate standing and evidence of satisfactory preparation in biological sciences.

**Bio 599 Thesis (3) (3) (3)**

Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing and consent of instructor.

## **BOTANY**

**Bot 121 General Botany (4)**

Introduction to structures and functions of seedbearing plants. 2 lectures, 2 laboratories.

**Bot 122 General Botany (4)**

Structure and relationships of plant groups from bacteria to angiosperms, emphasis on nonseedbearing plants of economic importance. 2 lectures, 2 laboratories. Prerequisite: Bot 121.

**Bot 123 Introductory Plant Taxonomy (4)**

Introduction to classification and identification of vascular plants, emphasizing the families of major economic importance; field and herbarium techniques. 2 lectures, 2 laboratories. Prerequisite: Bot 121.

**Bot 238 Native Plant Materials (3)**

Identification, habits of growth, cultural requirements and landscape use of native California plants suitable for landscape purposes. 2 lectures, 1 laboratory. Prerequisite: Bot 121.

**Bot 322 Introductory Plant Physiology (4)**

A consideration of the principal physiological processes of plants including water relations, mineral nutrition, photosynthesis, respiration, and growth of the plant. 3 lectures, 1 laboratory. Prerequisite: Bot 121 and Chem 226.

**Bot 323 Plant Pathology (4)**

Comprehensive study of the causes and effects of disease in plants. Designed to lead to an understanding of the science and modern control methods. 2 lectures, 2 laboratories. Prerequisite: Bot 122 or Bot 123.

**Bot 324 Ornamental and Forest Pathology (4)**

Causes and effects of diseases of important ornamental and forest plants, disease agents (life cycle, host range, environmental relationships), and modern approach to control. 2 lectures, 2 laboratories. Prerequisite: Bot 121.

**Bot 325 Plant Nematology (4)**

Plant parasitic nematodes, their morphology, classification, and the damage they cause plants, alone or in combination with other pathogens. 2 lectures, 2 laboratories. Prerequisite: Bot 323, Ent 326.

**Bot 326 Plant Ecology (4)**

Effects on plant growth and development of the following environmental factors: soil, water, temperature, light, atmosphere, topography, organisms, and fire. 3 lectures, 1 laboratory. Prerequisite: Bot 123.

**Bot 333 Field Botany (4)**

Field identification of native and introduced plants in nature; factors affecting California plant distribution and relationships. Emphasis on local species. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: Bot 123 or equivalent.

**Bot 334 Morphology of Vascular Plants (4)**

Phylogenetic relationships of the plant kingdom as illustrated by comparative morphology of the vascular plants including living and fossil forms. 2 lectures, 2 laboratories. Prerequisite: Bot 123.

**Bot 335 Plant Anatomy (4)**

Microscopic study of vascular plants dealing with the origin, development and structure of cells, tissues and organs. 2 lectures, 2 laboratories. Prerequisite: Bot 122.

**Bot 337 Algology (4)**

Classification of marine and fresh-water algae. Consideration of ecological, physiological and economic aspects. 2 lectures, 2 laboratories. Prerequisite: Bot 122.

**Bot 343 Advanced Plant Taxonomy (3)**

Systems of plant classification and principles on which they are based; use of morphology, cytogenetics, and ecology in classification; rules of botanical nomenclature. 2 lectures, 1 laboratory. Prerequisite: Bot 123.

**Bot 425 Plant Virology (4)**

Plant pathogenic viruses, their plant, insect, nematode and fungal host-pathogen relationships, symptom recognition, isolation and identification methods. 2 lectures, 2 laboratories. Prerequisite: Bot 323.

**Bot 426 Mycology (4)**

Comparative morphology and nuclear behavior of the fungi. A summary of the science with special attention given to forms important in agriculture, medicine and industry. 2 lectures, 2 laboratories. Prerequisite: Bot 122, Zoo 132, or consent of instructor.

**Bot 431 Advanced Plant Pathology (4)**

Methods, instruments, and materials used in diagnosis of plant diseases and in plant disease research. 2 lectures, 2 laboratories. Prerequisite: Bot 323 or 324.

## **BUSINESS**

**Bus 101 The Business Enterprise (4)**

Orientation to the Business Administration program. Examination of the business enterprise, stressing its historical, environmental, and economic setting. Business organization and functions. 2 lectures, 2 recitations.

**Bus 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

**Bus 201 Business Law Survey (3)**

An overview of business law for other than Business majors. Similar in scope to Bus 207, but in less detail. Not acceptable for credit toward Business Administration degree. 3 lectures.

**Bus 205 Consumer Law (2)**

Concepts of legal and self-protection in the marketplace. Procedures to use administrative agencies and court system. Specific interest areas: landlord-tenant; sales and warranties; consumer protection groups; home, auto, insurance purchases, etc. 2 lectures.

**Bus 207 Business Law (4)**

The American legal system, contracts, agency, business organizations, and real property. 4 lectures. Prerequisite: Sophomore standing.

**Bus 308 Advanced Business Law (4)**

The legal aspects of management decisions, including problems arising in sales, commercial paper, personal property and bailments, secured transactions, bankruptcy, competitive torts, and insurance, with emphasis on uniform commercial code. 4 lectures. Prerequisite: Bus 207 or equivalent and junior standing.

**Bus 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

**Bus 404 Governmental and Social Influences on Business (4)**

An analysis of the business enterprise in changing legal, social, political and ethical environment. The influence of administrative law, and the regulatory effects of anti-trust, environmental and securities law on the corporation. 4 lectures and senior standing.

**Bus 419 Business Research (3)**

Information gathering principles and techniques used in study and analysis of business activities. 3 lectures. Prerequisite: All 300-level Business core courses.

**Bus 430 Internship (4-8)**

Placement as an employee in a business firm approved by the department head. Periodic written progress reports required. Collateral reading correlated with the work experience. Credit/No Credit grading. Prerequisite: Approval of the department head.

**Bus 460 Senior Project (2)**

Selection and completion under faculty supervision of an investigative project typical of problems graduates must solve in their field of employment. Required minimum of 60 hours. Analytical, formal report is required. Prerequisite: Bus 419.

**Bus 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Bus 500 Independent Study (1-3)**

Advanced study planned and completed under the direction of a member of the Business Administration department faculty. Open only to graduate students who have demonstrated ability to do independent work. Prerequisite: Formal petition with approval.

## **CHEMISTRY**

**Chem 106 Introductory Chemistry (3)**

Measurement, metric system, properties of matter, chemical symbols, atomic structure, chemical formulas, nomenclature, chemical equations, the mole concept, stoichiometry. An introductory course in chemistry, not open to students who have credit for a college chemistry course. 3 lectures. Prerequisite: Math 103 or 109 or equivalent.

**Chem 121 General Chemistry (4)**

Fundamental principles including atomic structure, bonding, nomenclature, chemical equations, states of matter, solutions, and energy with attention to applications to related fields. Intended primarily for students whose majors are not in the Schools of Engineering and Technology or Science and Mathematics. Not open to students with credit for Chem 124 or 127. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or equivalent or permission of instructor.

**Chem 122 General Chemistry (4)**

Continuation of Chem 121. Colloids, kinetics, equilibrium, acids and bases, electrochemistry, nuclear chemistry, non metals, applications to related fields. Intended primarily for students whose majors are not in the Schools of Engineering and Technology or Science and Mathematics. Not open to students with credit for Chem 125 or 128. 3 lectures, 1 laboratory. Prerequisite: Chem 121.

**Chem 124 General Chemistry (4)**

Atomic structure, chemical equations, stoichiometry, inorganic nomenclature, solutions. Introduction to carbon compounds emphasizing fuels and polymers. Intended primarily for students whose majors are in the School of Engineering and Technology. Not open to students with credit for Chem 121 or 127. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or equivalent or permission of instructor.

**Chem 125 General Chemistry (4)**

Introduction to chemical thermodynamics, equilibrium, kinetics, acids and bases, coordination compounds, oxidation-reduction reactions, electrochemistry, corrosion, nuclear chemistry. Intended primarily for students whose majors are in the School of Engineering and Technology. Not open to students with credit for Chem 122 or 128. 3 lectures, 1 laboratory. Prerequisite: Chem 124.

**Chem 127 General Chemistry (4)**

Introduction to atomic structures, bonding, stoichiometry, nomenclature, gas laws, states of matter and solutions. Intended primarily for students whose majors are in the School of Science and Mathematics. Not open to students with credit in Chem 121 or 124. 3 lectures, 1 laboratory. Prerequisites: Chem 106, Math 109 or their equivalents.

**Chem 128 General Chemistry (4)**

Continuation of Chem 127. Discussion of colligative properties, colloids, kinetics, equilibria, acid-base equilibria, nuclear chemistry, thermochemistry and electrochemistry. Intended primarily for students whose majors are in the School of Science and Mathematics. Not open to students with credit in Chem 122 or 125. 3 lectures, 1 laboratory. Prerequisite: Chem 127.

**Chem 129 General Chemistry (4)**

Chemical equilibria, compounds of the metals, laboratory study of the chemical properties and semi-micro qualitative analysis of the representative group elements of the periodic table. Intended primarily for students whose majors are in the School of Science and Mathematics. 3 lectures, 1 laboratory. Prerequisite: Chem 125 or 128, or permission of instructor.

**Chem 156 General Chemistry Laboratory (1)**

Additional laboratory to be taken with Chem 126. Includes chemical properties and semi-micro qualitative analysis of the transition and post-transition metals. Ions of the periodic table, spectrographic analysis, methods of inorganic synthesis. 1 laboratory. Prerequisite: Chem 122, 125, or 128.

**Chem 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**Chem 226 Survey of Organic Chemistry (4)**

Structure, nomenclature, some characteristic reactions of functional groups and applications of organic chemicals in agriculture, medicine, industry and the home. A terminal survey course not open to students with credit in Chem 316. 3 lectures, 1 laboratory. Prerequisite: Chem 122, 125 or 128.

**Chem 252 Laboratory Glassblowing (1)**

Techniques of glassblowing applied to the making of simple laboratory apparatus. 1 laboratory. Prerequisite: Chem 121, 124 or 127.

**Chem 253 Chemical Literature (1)**

Chemical publications, periodicals, abstracting journals, review serials, patents, institutional publications, information retrieval. 1 lecture. Prerequisite: Chem 226 or 316.

**Chem 274 Chemistry of Drugs and Poisons (3)**

Biochemical actions of common natural and synthetic drugs and poisons. Basic principles and applications for students in non-biochemical disciplines. 3 lectures. Prerequisite: Chem 122, 125 or 128.

**Chem 301 Biophysical Chemistry (3)**

Basic physical chemistry for the study of biological systems. Kinetic-molecular theory, gas laws, principles of thermodynamics as applied to biochemical systems. Not open to students with credit in Chem 305. 3 lectures. Prerequisite: Chem 328 or concurrent 371, Phys 123 or 133, Math 131 or 141. Recommended: Math 132 or 142.

**Chem 302 Biophysical Chemistry (4)**

Application of physical chemistry to biochemical systems. Buffers, electrochemistry, reaction rate theory, enzyme kinetics, viscosity, surface and transport properties of macromolecules. Not open to students with credit in Chem 306. 3 lectures, 1 laboratory. Prerequisite: Chem 301 or 305; 328 or 371.

**Chem 305 Physical Chemistry (3)**

Introduction to chemical thermodynamics. Thermochemistry. Phase equilibria. Chemical equilibrium. 3 lectures. Prerequisite: Phys 123 or 133, Chem 125 or 129, Math 132 or 142.

**Chem 306 Physical Chemistry (3)**

Applications of chemical thermodynamics. Electrochemistry. Kinetic theory of gases. Chemical kinetics. 3 lectures. Prerequisite: Chem 305.

**Chem 307 Physical Chemistry (4)**

Introduction to quantum theory. Chemical bonding and molecular structure. Spectroscopy and diffraction. 3 lectures, 1 laboratory. Prerequisite: Chem 302 or 306 and 356, or consent of instructor.

**Chem 316 Organic Chemistry (4)**

Structure, bonding, nomenclature, isomerism, stereochemistry and physical properties of organic compounds. Reactions and mechanisms of alkanes, alkenes, alkynes, cycloalkanes. Laboratory techniques in organic preparations. 3 lectures, 1 laboratory. Prerequisite: Chem 122, 125 or 128.

**Chem 317 Organic Chemistry (5)**

Reactions and reaction mechanisms of organic halides, alcohols, phenols, epoxides, ethers, carboxylic acids and their derivatives, aldehydes, ketones; acidity and basicity; infrared and NMR spectroscopy. 3 lectures, 2 laboratories. Prerequisite: Chem 316.

**Chem 318 Organic Chemistry (5)**

The chemistry of amines, aromatic compounds, heterocycles, macromolecules, some biomolecules, carbanions, rearrangements; mass spectrometry. Practice in organic synthesis. 3 lectures, 2 laboratories. Prerequisite: Chem 317.

**Chem 328 Biochemistry (4)**

Fundamental chemistry of carbohydrates, proteins, fats, vitamins, enzymes and hormones as applied to their function in plant and animal metabolism. Special reference to the chemistry involved in the use, analysis and manufacture of feeds, foods and other agricultural products. 3 lectures, 1 laboratory. Prerequisite: Chem 226.

**Chem 331 Quantitative Analysis (5)**

Theory and application of chemical equilibrium to analytical problems. Survey of important analytical methods with stress placed on the theory and application associated with titrimetric and spectrophotometric analysis. 3 lectures, 2 laboratories. Prerequisite: Chem 129.

**Chem 332 Quantitative Analysis (4)**

Analytical techniques stressing procedures based upon titrimetric precipitometry, gravimetric analysis and continuation of redoximetry. Properties of precipitates and colloids as applied to industrial analytical chemistry. 2 lectures, 2 laboratories. Prerequisite: Chem 331.

**Chem 335 Quantitative Physiological Chemistry (3)**

Quantitative determination of metabolites in biological fluids. Medical laboratory techniques in analysis of serum, blood and urine for glucose, nitrogenous substances, electrolytes, and lipids. 2 lectures, 1 laboratory. Prerequisite: Chem 328 or 371, and 331.

**Chem 336 Quantitative Physiological Chemistry (4)**

Theory of biochemical techniques in clinical chemistry and pathology, metabolic and organ-specific investigations and interpretation of results, clinical instrumentation, serum enzyme and hormone assay techniques. 2 lectures, 2 laboratories. Prerequisite: Chem 335.

**Chem 341 Environmental Chemistry I (3)**

Nature, composition, reactions, redox equilibria and complexation in natural water systems. Microorganisms as aquatic catalysts, heterogeneous reactions, chemical aspects of water treatment and pollution. 3 lectures. Prerequisite: Chem 129.

**Chem 342 Environmental Chemistry II (3)**

Nature and composition of the atmosphere. Oxides of carbon, sulfur and nitrogen. Organic and inorganic pollutants, particulate matter, photochemical smog. Environmental chemistry of soil and mineral resources. 3 lectures. Prerequisite: Chem 129 and 226 or 316.

**Chem 344 Chemical Process Principles (3)**

Fundamental terms, concepts, and principles used in the chemical processing industries. 3 lectures. Prerequisite: Chem 316 or consent of the instructor.

**Chem 355 Physical Chemistry Laboratory (1)**

Experimental studies of gases, solutions, thermochemistry and chemical equilibria. 1 laboratory. Corequisite: Chem 305.

**Chem 356 Physical Chemistry Laboratory (1)**

Experimental studies of phase rule, electrochemistry and chemical kinetics. 1 laboratory. Corequisite: Chem 306.

**Chem 371 General Biochemistry I (4)**

Chemical and physical factors in biological processes. Chemistry and function of major cellular constituents: proteins, nucleic acids, lipids, carbohydrates. 3 lectures, 1 laboratory. Prerequisite: Chem 316, 331. Recommended: Chem 301 and 317.

**Chem 372 General Biochemistry II (3)**

Intermediary metabolism, regulation and integration of metabolic pathways, bioenergetics, photosynthesis, electron transport, nitrogen fixation, biochemical function of vitamins and minerals. 3 lectures. Prerequisite: Chem 371.

**Chem 373 General Biochemistry III (3)**

Protein conformation and synthesis, structure of the active site and mechanism of enzyme action. Biochemical genetics, cell differentiation and control. 3 lectures. Prerequisite: Chem 371.

**Chem 374 Biochemistry Laboratory (2)**

Experiments in metabolism, including animal and microbial studies; isolation and characterization of enzymes and nucleic acids. 2 laboratories, offered during the same day or on consecutive days to simulate biochemical research conditions. Prerequisite: Chem 371.

**Chem 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

**Chem 405 Advanced Physical Chemistry (3)**

Chemical structure. Fundamentals of quantum chemistry, spectroscopy, and the electronic structure of atoms and molecules. Contemporary bonding theories. 3 lectures. Prerequisite: Chem 307.

**Chem 419 Advanced Organic Chemistry (3)**

A detailed study of the mechanisms of organic reactions and related topics. 3 lectures. Prerequisite: Chem 305, 318.

**Chem 435 Food Analysis (4)**

Techniques used commercially in the chemical analysis of seed and cereal crops, fruit and vegetable crops, forage crops, meat and meat products, milk and dairy products, eggs and poultry products. Vitamin determinations, microbiological assay, quality control, taste testing, legal specifications, grading and labeling. 3 lectures, 1 laboratory. Prerequisite: Chem 328.

**Chem 436 Agricultural Chemicals (4)**

Chemistry of fungicides, insecticides, rodenticides, plant growth regulators, soil conditioners, and fertilizers. Special reference to the analysis, manufacture, toxicology, legal specification, and regulations. 3 lectures, 1 laboratory. Prerequisite: Chem 328.

**Chem 439 Instrumental Analysis (4)**

Optical, electroanalytical and other techniques of modern instrumental analysis. Current industrial applications. Laboratory work in instrumental methods is emphasized. 2 lectures, 2 laboratories. Prerequisite: Chem 306, 331, 356 or Chem 302, 331. Recommended: 307.

**Chem 444 Polymer Chemistry (3)**

Polymerization methods and reaction mechanisms; physical properties of polymers and their measurement; chemistry of initiators, catalysts and inhibitors; stereospecific polymers; uses of representative types. 3 lectures. Prerequisite: Chem 317.

**Chem 457 Qualitative Organic Analysis (3)**

The experimental determination of the identity of organic compounds. Emphasis on chemical methods. 1 lecture, 2 laboratories. Prerequisite: Chem 317.

**Chem 458 Instrumental Organic Qualitative Analysis (2)**

Laboratory identification of organic molecules using instrumental and chemical methods including nuclear magnetic resonance, gas chromatography and infrared, ultraviolet and mass spectrometry. 2 laboratories. Prerequisite: Chem 457.

**Chem 459 Undergraduate Seminar (2)**

Oral presentation of current developments in chemistry based on current literature. Preparation for employment and for independent work in chemistry. 2 meetings. Prerequisite: Senior standing.

**Chem 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Chem 459.

**Chem 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Chem 301, or 305, or 317 or consent of instructor.

**Chem 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

**Chem 474 Biochemical Pharmacology (3)**

Consideration of principles governing drug absorption, distribution, metabolism, storage, excretion, dose-effect and structure-function relationships, with emphasis on sites and biochemical mechanisms of action. A brief summary of drug types and activity will be made. 3 lectures. Prerequisite: Chem 317, 371 or permission of instructor.

**Chem 481 Inorganic Chemistry (3)**

A systematic study of important elements based on periodic grouping and atomic structure with emphasis on chemical bonding, coordination compounds, and acid-base relationships. 3 lectures. Prerequisite: Chem 306 or permission of instructor.

**Chem 482 Inorganic Chemistry (3)**

Applications of electrode potentials to inorganic systems; nomenclature, bonding, stereochemistry, stability and reactions of coordination compounds; chemistry of the transition elements, lanthanides, organometallics and metal carbonyls; bioinorganic chemistry. 3 lectures. Prerequisite: Chem 481.

**Chem 501 Physical Chemistry—Thermodynamics (3)**

Fundamental theory and methods of thermodynamics, with application to the calculation of thermodynamic properties. 3 lectures. Prerequisite: Chem 307, 316 or consent of instructor.

**Chem 502 Physical Chemistry—Quantum Chemistry (3)**

Theory and methods of quantum chemistry with application to the investigation of molecular structure, chemical bonding, and molecular spectra. 3 lectures. Prerequisite: Chem 405 or consent of instructor.

**Chem 503 Physical Chemistry—Kinetics (3)**

Reaction rates and mechanisms of elementary processes; homogeneous and heterogeneous reactions and catalysis. 3 lectures. Prerequisite: Chem 307, 318 or consent of instructor.

**Chem 514 Advanced Organic Chemistry—Synthesis (3)**

Modern and practical methods of constructing molecules. 3 lectures. Prerequisite: Chem 318.

**Chem 515 Advanced Organic Chemistry—Mechanisms (3)**

Mechanisms of pericyclic reactions; selection rules. Introduction to photochemistry; free radical reactions. 3 lectures. Prerequisite: Chem 318.

**Chem 516 Advanced Organic Chemistry—Natural Products (3)**

Structure determination and total synthesis of compounds of biological origin. 3 lectures. Prerequisite: Chem 318.



**Chem 541 Synthetic Methods (2–4)**

Techniques for synthesis of organic and inorganic substances. Macroscopic and microscopic procedures of industrial significance. Use of modern equipment and methods; anaerobic, low and high temperature, low and high pressure, and conventional procedures. 2 to 4 laboratories. Prerequisite: Chem 318.

**Chem 577 Advanced Biochemistry (3)**

Physico-chemical properties of proteins, nucleic acids and enzymes. 3 lectures. Prerequisite: Chem 306, 373 or consent of instructor.

**Chem 578 Advanced Biochemistry (3)**

Food and nutritional aspects of biochemistry. Vitamins, amino acids, essential fatty acids, minerals, energy metabolism. Deficiency and degenerative diseases. Synthetic and imitation foods. 3 lectures. Prerequisite: Chem 328.

**Chem 579 Advanced Biochemistry (3)**

Molecular biochemistry of cellular ultrastructure, function and division. Function and transformation of biomolecules in plants and animals. 3 lectures. Prerequisite: Chem 373.

**Chem 590 Graduate Seminar (1)**

Presentation of advanced topics in chemistry, including original work by faculty, guests, and graduate students. Topics will vary each quarter. Total credit limited to 3 units. Required of all graduate students in chemistry. 1 meeting. Prerequisite: graduate standing in chemistry, or consent of instructor.

**Chem 598 Internship (3–6)**

Supervised technical field experience in areas such as chemical sales, manufacturing, process development, clinical chemistry, analytical chemistry, pollution control. Prerequisite: Graduate standing or consent of instructor, and approval of the department head and school dean.

**Chem 599 Thesis (3) (3) (3)**

Individual research under the general supervision of the staff leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing in chemistry.

## **CHILD DEVELOPMENT**

**CD 101 Orientation (2)**

Introduction to the child development major from campus and career perspectives. Offered only on a Credit–No Credit basis. 2 lectures.

**CD 103 Pairing and Marriage (3)**

A functional approach to contemporary dating and pairing patterns with emphasis on cross-sex communication during the developmental stages of the paired relationship. 3 lectures.

**CD 108 Child, Family, and Community (3)**

Influence of family, society, and cultural forces on the behavior of children. Role of parents, teachers, and professional workers in the healthy personality development of the child. 3 lectures.

**CD 129 Observation of Human Behavior (3)**

Nonparticipant observation of human behavior—individuals and groups. Specific techniques of reporting and interpreting observations. 2 lectures, 1 laboratory. Concurrent with CD 130.

**CD 130 Laboratory I: Beginning Study of Children and Families (3)**

Introduction to children and families in the preschool and home environment. Participant observation and interaction with children, teachers, peers and parents. 1 lecture, 2 laboratories. Concurrent with CD 129.

**CD 200 Special Problems for Undergraduates (1-2)**

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**CD 203 Family Development (3)**

Survey of family living at each stage of the life cycle. Emphasis on developmental tasks, socio-economic and cultural influences, and family differences. 3 lectures.

**CD 227 Infant and Toddler Development (3)**

Basic principles of development. Growth and development from conception through the second year. Characteristic behavior patterns of the infant and toddler in relation to the environment. 3 lectures. Prerequisite: Psy 201 or 202, CD 108.

**CD 228 Preschool and Middle Childhood Development (3)**

Development and behavior from the third through the ninth year. Intellectual, physical, emotional, social, and moral development of the young child. 3 lectures. Prerequisite: CD 227.

**CD 229 Preschool Activities Planning (3)**

Curriculum development and organization in the preschool. 3 lectures. Prerequisite: CD 130, 228. Concurrent with CD 230.

**CD 230 Laboratory II: Children and Families in the Preschool Milieu (4)**

Faculty supervised on-campus teaching experience with children and families in a preschool laboratory setting. 2 lectures, 2 laboratories. Prerequisite: CD 130, 228. Concurrent with CD 229.

**CD 301, 302 Ethnic Minorities: Children and Families (3) (3)**

Socio-cultural dimensions involved in the learning and socialization processes of various ethnic minority groups. Emphasis on history, experiences and cultural backgrounds. 3 lectures. Sequence courses, CD 301 is prerequisite to CD 302.

**CD 303 Family Interaction (3)**

Dynamic aspects of family interaction. Examination of behavior, attitudes, values, and reciprocity within a variety of family settings. 3 lectures. Prerequisite: CD 103 and 203.

**CD 304 The Helping Relationship (3)**

Basic skills common to helping relationships with children and families. Theory, practice and case applications of helping. Differentiation between professional, paraprofessional and nonprofessional helping relationships. 3 lectures. Prerequisite: Upper division or graduate standing, or consent of instructor.

**CD 330 Child Development Field Experience (3-6)**

Internship in a preschool, child care center or community facility. Consultation with faculty supervisor. 1 lecture. 2-5 laboratories. Prerequisite: CD 230, Engl 260, Th 347, PE 280 and consent of instructor. Must be taken for a total of 6 units. Either two consecutive quarters (3 units each) or one quarter (6 units).

**CD 400 Special Problems for Advanced Undergraduates (1-2)**

Supervised investigation, including a written report, of a topic chosen with the prior approval of instructor. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**CD 401 Foundations of Child Development (3)**

Past, present and future perspectives in theory and research on child development and on programs for young children. 3 lectures. Prerequisite: CD 330 or consent of instructor.

**CD 404 Administration of Child Development Centers (3)**

Organization and administration of preschool and child care centers. Staffing, finance, equipment, records, regulations and community relations. 3 lectures. Prerequisite: CD 330, 401.

**CD 413 Parent-Child Relationships (3)**

Reciprocal interaction between parents and children. Styles of parenting and their effects on the socialization process. 3 lectures. Prerequisite: Junior standing.

**CD 430 Experimental Lab (6)**

Faculty-supervised experience working in specialist positions with children in preschools, child care centers or community facilities. 2 lectures, 4 laboratories. Prerequisite: CD 330, 401.

**CD 446 Adolescence (3)**

A developmental perspective of change and constancy during the years between prepubescence and young adulthood. 3 lectures. Prerequisite: CD 228 or consent of instructor.

**CD 447 Adulthood and Aging (3)**

Analysis of the middle and later stages of individual and family development. 3 lectures. Prerequisite: CD 203 or consent of instructor.

**CD 450 Introduction to Family Counseling (3)**

Basic elements of marriage and family counseling. Emphasis on concepts, goals, and techniques of various counseling approaches. 3 lectures. Prerequisite: Upper division or graduate standing or consent of instructor.

**CD 451 Family Crises (3)**

Analysis of causes and effects of crises on the family. Methods for prediction, control, and solution of family crises. 3 lectures. Prerequisite: Upper division or graduate standing or consent of instructor.

**CD 453, 454, 455 Supervised Field Work (4) (4) (4)**

Supervised field work in public or private agencies. Maximum of 4 units per quarter. Minimum of 8 units required for Family Studies concentration students. Prerequisite: CD 304, junior standing and consent of instructor.

**CD 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. The project must be related to the child or family fields. Results of the project must be presented in a formal, written report. Minimum of 120 hours total time. Prerequisite: CD 330 or CD 453 and consent of instructor.

**CD 463 Undergraduate Seminar (2)**

Study and discussion of current developments in the field of child development. 2 lectures. Prerequisite: Senior standing.

**CD 464 Current Issues in Family Life Education (2)**

Evaluation of the role of family life specialists in relation to the teaching profession, public service agencies, and the community. 2 lectures. Prerequisite: CD 203 or consent of instructor.

**CD 470 Selected Advanced topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**CD 481 Family Theory (2)**

Analysis of the major theoretical approaches to family behavior. 2 lectures. Prerequisite: Senior standing.

## CITY AND REGIONAL PLANNING

### CRP 211 Introduction to Urbanization (3)

Evolution, planning, and design of cities. Interpretation of environmental, social, economic, and technological factors that have influenced the physical organization, planning, and design of cities. 3 lectures.

### CRP 212 Introduction to Urban Planning (3)

Problems and responses to contemporary urban growth and change. Development of theories of urban planning and design. Introduction to zoning, planning regulations and codes, professional practice. The relationship of environmental design disciplines, citizen groups, and individuals to planning. 3 lectures.

### CRP 213 Introduction to Planning Information (3)

Sources of information and data related to City and Regional Planning, Architecture, and Environmental Design. Search, selection, reduction of data, and application to program development. 3 lectures.

### CRP 218 Exploring Future Environments (3)

Current issues in environmental planning and environmental preservation. Survey and synthesis of environmental problems and decisions from the viewpoint of the various disciplines concerned with the trade-offs, conflicts, policy development and environmental management. 3 lectures.

### CRP 240 Additional Planning Laboratory (1-2)

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

### CRP 243 Urban Site Planning (3)

Designing urban neighborhoods, redesigning for Urban Renewal and creating new communities. 3 activities. Prerequisite: CRP 212.

### CRP 301, 302 Planning Theory (3) (3)

Planning theory and related topics. 3 lectures. Prerequisite: CRP 213, EDes 203.

### CRP 316 Quantitative Methods for Planning (3)

Application of quantitative methods to practical problems and policy questions in land use, environmental impact, population, employment, housing, community development and regional planning. Concepts and computational methods to extend the effectiveness of public decision-making in city and regional planning. 3 lectures. Prerequisite: Stat 212.

### CRP 347, 348, 349 Design for Planners (3) (3) (3)

Three-dimensional design with emphasis on spatial relationships and urban forms. The physical city. Effect of color, texture and scale, open spaces. Landscaping and architecture. 3 laboratories. Prerequisite: CRP 212, EDes 110, 203.

### CRP 351, 352, 353 Planning Laboratory (4) (4) (4)

Case study application of planning theory to the community, its components, and to the city and the region. Relationships of city spaces and structures. Redevelopment. Field trips. Individual team, and interdisciplinary approaches. Computer applications. 4 laboratories. Prerequisite: CRP 213, EDes 203.

### CRP 360 Urban Aesthetics (1-3)

Aesthetics as an important aspect of the physical and social organization of cities. Identification and study and evaluation of aesthetic design in the context of the present. 1-3 meetings. Prerequisite: Junior standing and consent of instructor.

### CRP 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**CRP 401, 402 Planning Theory (3) (3)**

Advanced planning theory and related topics. 3 lectures. Prerequisite: CRP 302, 353.

**CRP 417 Urban Systems Design (3)**

Application of system design concepts to the design of planning models. Study of symbolic models to test and evaluate the organization of urban structures. 3 lectures. Prerequisite: CRP 316 or consent of instructor.

**CRP 418 New Town Planning (3)**

History, present situation and future of new town planning in the United States. Relationship to other countries. 3 lectures. Prerequisite 212.

**CRP 420 Environmental and Planning Regulations (3)**

Public controls protecting natural environmental systems. Land use and resource controls. Review of control mechanisms. State and federal legislation. Legal implications of controls, public planning and policy issues. 3 lectures. Prerequisite: CRP 302, 353.

**CRP 425 Plan Implementation (3)**

Zoning theory and legal background as a device to guide urban growth; the zoning ordinance, the districting plan. Subdivision regulations; the Capital Improvement program; mandatory referral; eminent domain; official plan lines; building, health, sanitation, housing and fire codes; grants administration. 3 lectures. Prerequisite: CRP 353 or consent of instructor.

**CRP 435 Transportation Theory (3)**

The circulation and transportation elements of the General Plan. Transportation planning theory, methods and tools related to systematic analysis of city and regional transportation problems including environmental impact assessment. 3 lectures.

**CRP 451, 452, 453 Planning Laboratory (4) (4) (4)**

Continuation of CRP 351, 352, 353. 4 laboratories. Prerequisite: CRP 302, 349, 353.

**CRP 457 Planning Information Systems (3)**

Use of a problem-oriented system to retrieve statistical information pertinent in planning. 3 lectures. Prerequisite: Stat 212, EDes 250, 4th year standing.

**CRP 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. To be completed in two consecutive quarters. Minimum 120 hours total time. Prerequisite: CRP 302, 349, 353.

**CRP 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**CRP 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

**CRP 501, 502 Foundations in the Planning Process and Planning Regulations (4) (3)**

Evolution of the planning process. Techniques and approaches used in plan preparation within the context of changing rural and urban concerns. Land use, circulation systems, and open space planning. Regulatory and nonregulatory means for plan implementation. Planning and environmental law issues. 4, 3 lectures.

**CRP 505 Perspectives in Regional Planning (3)**

History, development and major philosophical approaches of regional history, development and major philosophical approaches of regional planning, both in urban-centered and resource-based regions. Effects of relaxing natural, economic and infrastructure limiting factors on growth and development of regions. The normative hierarchical emphasis of contemporary regional planning compared to emerging paradigms that alter the regional/local planning relationship. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**CRP 510 Contemporary Planning Theory (3)**

Development of contemporary planning thought from historical roots. Intensive study of planning literature. Alternative value systems and planning processes. Current approaches and philosophies in the United States and other countries. 3 lectures.

**CRP 511 Advanced Planning Theory (3)**

Indepth study of selected problem-solving approaches and philosophies for planners in the analysis of social, technological, economic, and political trends. Emphasis on topics of current interest. 3 lectures. Prerequisite: CRP 510 or equivalent.

**CRP 515 Graphic Communication for Planners (3)**

Basic techniques used in graphic communication. Orthographic, isometric and perspective drawing. Introduction to various drawing media and delineation and presentation techniques for planners. Designed to develop three dimensional visualization, graphic skills and basic proficiency in the exploration and communication of information and design ideas. 3 laboratories.

**CRP 516 Quantitative Methods in Planning (3)**

Problem recognition, data selection, analysis and synthesis with applications: of system design, statistical techniques and symbolic modeling to urban design and regional growth and development policies. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**CRP 520 Feasibility Studies in Planning (3)**

Base studies and economic development. Fiscal effectuation of policies and plans. The tax base and tax policies related to land use planning. Social accounting and overhead. Cost benefit studies and economic feasibility of plans. Long-range financial planning. Phasing and time scheduling. 3 lectures. Prerequisite: CRP 502 or equivalent.

**CRP 525 Planning Legislation (3)**

Federal and state planning enabling acts. Planning law and police power. Use of police power in zoning and subdivision regulations. Eminent domain, building, health and sanitary codes. Public policy versus private property. Court decisions and their effect on planning policies. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**CRP 530 Planning Administration (3)**

Relationships of planning agencies to other governmental bodies, public agencies and citizen groups. The public planning agency and the private practitioner. Public and personnel relations. Current topics in planning administration. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**CRP 531 Utility Systems Planning (3)**

Water, electrical, gas and communications service systems; storm drainage and flood control; sewage and waste disposal. Influences on land patterns and development practices. Standards and control regulations. Advanced technologies in energy supply systems and waste disposal. 3 lectures.

**CRP 532 The City in History (3)**

Historical development of the city as a reflection of cultural patterns of each period or civilization. Analysis of land use, circulation systems, defensive mechanisms and architectural form. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**CRP 548 Philosophy of Urban Design (3)**

Introduction to the philosophy and theory particular to environmental design. Exploration of evaluation criteria and critical analysis of man's environment related to design and human needs. Spatial and form relationships, scale, human activities, concept formation, visual organization of the city, landscaping and architecture. 3 lectures.

**CRP 552, 553 Planning Laboratory (5) (5)**

Case study applications of planning theory and processes to urban and regional problems in increasing complexity. Interrelationships and impacts of economic and social conditions, technology, resource use, the natural and the built environments. Field trips. Individual, team and interdisciplinary approaches. 5 laboratories. Prerequisite: CRP 511, 512.

**CRP 554, 555 Advanced Planning Laboratory (5) (5)**

Application of advanced theory and methods to the solution of complex micro and macro scale planning problems of spatial allocation and planning policy. Research, analysis, synthesis and implementation practice. 5 laboratories. Prerequisite: CRP 502 and 553 or equivalent, CRP 505, 506, 510, 516.

**CRP 570 Selected Topics in Planning (3)**

Directed group study of selected topics in planning theory. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRP 599 Thesis (6)**

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Prerequisite: CRP 501, 507, 516, 555.

## **CIVIL ENGINEERING**

**CE 121 Civil Engineering Fundamentals (2)**

Engineering approach to problem solving. Analysis of land, air, and water transportation systems. Basic nomenclature and design criteria used in the field. Applications to specific problems. Discussions with practicing engineers on subjects of current interest. 2 lectures.

**CE 122 Civil Engineering Fundamentals (2)**

Continuation of CE 121. Application of basic design criteria to specific design problems. 2 activities. Prerequisite: CE 121.

**CE 123 Civil Engineering Fundamentals (2)**

Introduction to problem solving and analysis of data necessary in the profession. Methods and techniques available to the civil engineer for use in study and design of systems. 2 activities. Prerequisite: CE 122.

**CE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**CE 202, 203 Mechanics of Materials (3) (2)**

Stresses, strains and deflections due to axial, torsional, and flexural loading. Statically indeterminate members and columns; Mohr's Circle and column buckling. Emphasis on problem-solving. May not be substituted for CE 207. CE 202: 3 lectures; CE 203: 1 lecture, 1 laboratory. Prerequisite: ME 205.

**CE 207 Strength of Materials (5)**

Stresses, strains, and their relations applied to axial, torsional, and flexural loads. Statically indeterminate axial members, beams, and shafts. Material properties, load classification and stability of columns. 5 lectures. Prerequisite: ME 211.

**CE 208, 209 Strength of Materials (3) (3)**

Stresses, strains and their relations applied to axial, torsional and flexural loads. Statically indeterminate axial members, beams and shafts. Columns, dynamic loads, repeated loads. Tension, compression, bending, shear, and torsion tests. Use of the SR-4 strain rosette for determining principal strains. CE 208: 3 lectures; CE 209: 2 lectures, 1 laboratory. Prerequisite: ME 211.

**CE 221 Introduction to Traffic Problems and Transportation (4)**

Elements of ground and water traffic circulation and planning, Driver and vehicle performance. Traffic analysis and control. Planning of air, water and ground transportation units and terminals as elements of complete transportation systems. 3 lecture-discussions, 1 laboratory. Prerequisite: CE 123.

**CE 228 Civil Engineering Materials (3)**

Concepts of stress, strain, stress distribution. Engineering phenomena involving materials used in public works facilities. 2 lectures, 1 laboratory. Prerequisite: Phys 133, Chem 124, CE 207.

**CE 229 Strength of Materials Laboratory (1)**

Physical properties of engineering materials. Tension, compression, bending, shear, and torsion tests. Stress and strain transformation. Current strain gauge technology. 1 laboratory. Concurrent: CE 207.

**CE 322, 323 Structural Analysis (3) (3)**

General structural theorems, energy methods, influence diagrams, deflection of structures, analysis of statically determinate and indeterminate structures. Introduction to matrix methods of analysis and dynamic response. 3 lectures. Prerequisite: CE 208, 209.

**CE 324 Traffic Engineering—Operations and Controls (4)**

Techniques for making traffic engineering investigations; traffic laws and ordinances, speed regulation, curb parking regulations, through controls, one-way streets, right-of-way regulations; design and application of signs, markings, lighting; and traffic engineering. 3 lecture-discussions, 1 laboratory. Prerequisite: CE 221 or equivalent.

**CE 325 Public Works Design (3)**

Underlying principles of layout, selection of type and size of various units, and principles of loading involved in designing public works systems in urban and rural locations. 3 lectures. Prerequisite: CE 208, 209, 323.

**CE 326 Drainage Systems (3)**

Application of rainfall intensity, frequency and duration statistics to design of drainage systems for transportation facilities. Procedures for sizing of storm sewers, culverts, inlets and bridges. Plan and specification preparation procedures. 2 lectures, 1 activity. Prerequisite: ME 341, CE 121.

**CE 329 Civil Engineering Materials (3)**

Experimental determination of mechanical properties of concrete, asphalt, and soils as required for engineering applications. Experimental verification of assumptions made in mechanics of materials procedures. Use of strain measuring devices. Preparation of technical reports. 1 lecture, 2 laboratories. Prerequisite: CE 208, 228.

**CE 400 Special Problems for Advanced Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.



**CE 421 Airfield and Highway Structures (4)**

Theories, principles, and procedures in the structural design of highway and airfield pavements. Design of rigid and flexible pavements. Construction and maintenance procedures for pavements and stabilized bases. 3 lecture-discussions, 1 laboratory. Prerequisite: CE 329.

**CE 422 Geometric Design of Highways (4)**

Location and safe geometric design of highway and other transportation facilities. Earthwork and drainage related to highway, railway, dock, and airport design. Theory and practice in design of alignments, highway cross-sections, intersections, interchanges, and freeways in urban and rural areas. 3 lecture-discussions, 1 laboratory. Prerequisite: CE 221, 329.

**CE 423 Structural Steel Design (4)**

Design and behavior of the elements of steel structures. Proportioning of members and connections. Introduction to plastic design. 2 lecture-discussions, 2 laboratories. Prerequisite: CE 323, 329. Concurrent: MET 306.

**CE 433 Transportation Systems Planning (4)**

Planning of urban and statewide transportation systems. Air, water, rail, highway, and pipeline systems separately and in combination. Selection of routes and types of systems based on economic, social, technological, and other characteristics. Planning of terminals for all types of transportation systems. 3 lecture-discussions, 1 laboratory. Prerequisite: IE 414, CE 221, Econ 211.

**CE 434 Public Transportation (3)**

Interdisciplinary aspects of public transportation problems, systems-team design approach to solutions. History and present state of public transportation; role of public transportation in urban environment; legislative, political, social, and economic aspects of public transportation systems. Methodology and procedures for transit planning. Review of transit studies. 2 lectures, 1 activity. Prerequisite: Senior standing or permission of instructor.

**CE 435 Airport Planning and Design (3)**

Historical background of aviation and airport development; financing; estimating demand; aircraft characteristics; air traffic control; site selection; airport configuration; geometric design of landing area; planning and development of terminal areas; lighting; pavement design and drainage; design of heliports. 2 lectures, 1 laboratory. Prerequisite: CE 221 or equivalent.

**CE 436 Personal Rapid Transit Systems (3)**

Survey of present technologies and planning studies. Methodologies for assessing alternative systems and strategies for implementation of a system. Class designed project for a selected environment. 3 lectures. Prerequisite: Senior standing or consent of instructor.

**CE 437 Bituminous Materials and Mixtures (4)**

Consideration of major types of bituminous materials—asphalt cements, cutback asphalts, asphalt emulsions and tars. Influence of chemical composition upon physical properties. Desirable aggregate characteristics for bituminous mixtures. Construction techniques for highways, airports, etc. Current practices for determining optimum asphalt contents. Design of bituminous mixes with evaluation methods, field testing plant control, etc. 3 lectures, 1 laboratory. Prerequisite: CE 228, 229.

**CE 438 Public Works Contract Administration (3)**

Legal aspects of public works contract documents, change orders, surety bonds, and contractual relationship between engineer-contractor, engineer-owner. Critical elements of project cost estimating on contracts for highway, airfield, and other public works construction. Theory of specification preparation, interfacing with OSHA, environmental considerations, cost accounting control. Labor provisions, resident engineer inspector responsibilities and authority and general project management techniques. 3 lectures. Prerequisite: Senior or graduate standing and consent of instructor.

**CE 461, 462 Senior Project (2) (2)**

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time Prerequisite: CE 421, 422.

**CE 463 Undergraduate Seminar (2)**

New developments, policies, practices, and procedures discussed in seminar sessions. Each individual is responsible for the development and effective presentation of topics in his area of emphasis. 2 meetings. Prerequisite: Senior standing.

**CE 464 Professional Practice (3)**

Basic elements of professional engineering practice. Professional ethics, procedures, contracts, specifications, cost estimating, and engineer-client relationship. 3 lectures. Prerequisite: Senior standing.

**CE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**CE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**CE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**CE 508 Variational Principles in Solid Mechanics (3)**

Potential energy method; direct and indirect methods of the calculus of variations, effects of extensional deformation and initial curvature, applications to straight and curved beams, plates. Complementary energy principle; development of compatibility equations; applications to St. Venant torsion and shear lag, frames. 3 lectures. Prerequisite: 400 level course in structures.

**CE 570 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Graduate standing and consent of instructor.

**CE 571 Transportation and Traffic Planning Models (3)**

Development, analysis and discussion of applications of mathematical and schematic replicative, predictive and planning models in transportation and traffic engineering design problems. Selection of balanced transportation systems based on use of modal split and traffic models. 2 lectures, 1 activity. Prerequisite: Engr 251, Math 242, Stat 322, CE 433.

**CE 572 Transportation Structural Modes (3)**

Principles of similitude; relationship to prototypes and experimental measurements of transportation structural models. 2 lectures, 1 activity. Prerequisite: CE 423 and consent of instructor.

**CE 573 Public Works Administration (3)**

Management and engineering of transportation and related systems in public jurisdictions. Traffic systems, streets and highways, illumination, distribution systems, etc. Personnel management, financing, public relations, and contract management. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

#### CE 574 Matrix Analysis of Public Works Structures (3)

Matrix terminology and operations; matrix procedures for analysis of continuous beams, plane frames, and space frames under static and quasi-static loading; stiffness and flexibility methods; computer applications; special techniques for larger systems. 3 lectures. Prerequisite: CE 322, 323; Graduate or senior standing.

## COMPUTER SCIENCE

#### CSc 101 Fortran Programming (2)

Emphasis on programming techniques for mathematical analysis. Business and science applications. 2 lectures.

#### CSc 110 Computers and Computing (3)

Applications of computers in modern society. Survey of the development of the art of computing and of computing devices from ancient times to the modern digital computer. Relationship of mathematics to computing procedures. How computers are programmed. 3 lectures.

#### CSc 118 Fundamentals of Computer Science (3)

Introduction to problem solving methodology and computer science. Problem statements, solution procedures, algorithms, and computer programs. Problem solving using digital computers and campus computing facilities. 3 lectures.

#### CSc 120 Principles of Business Data Processing (3)

Fundamental concepts of programming. The BASIC language. Use of interactive terminals. Introduction to the COBOL language. Applications of computers to data processing problems. Uses of database systems to data processing applications. Primarily for Business majors. Credit not allowed for Computer Science major. 3 lectures. Prerequisite: High school algebra.

#### CSc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

#### CSc 201 Advanced Fortran Programming (3)

Programming in extended Fortran language with emphasis on program efficiency and advanced features. Comparison of Fortran implementations. 3 lectures. Prerequisite: CSc 101 or CSc 118.

#### CSc 210 Non-Numeric Processing (3)

Concepts and algorithms for non-numeric information processing. Processing of natural language text. Models of complex information processing systems. Applications to cognitive processes and problem-solving. List and string processing languages such as LISP and SNOBOL. 3 lectures. Prerequisite: One programming course.

#### CSc 219 Linear Programming (3)

Introduction to linear programming, the simplex algorithm, duality, sensitivity and post optimal analysis. Use of linear programming techniques to solve linear optimization models. 3 lectures. Prerequisite: 6 units of college mathematics.

#### CSc 221 Computer Principles and Programming (3)

Architecture of System/360-370 computers. Introduction to Basic Assembler Language with emphasis on the instructions associated with the general purpose registers. Techniques of programming in an assembly language. 3 lectures. Prerequisite: CSc 101, 118 or equivalent.

#### CSc 222 Digital Computer Symbolic Programming (3)

System/360-370 Basic Assembler Language. Advanced Assembly Language programming with emphasis on subroutine linkages, floating-point and packed decimal instructions. Introduction to data control blocks and macro writing. 3 lectures. Prerequisite: CSc 221.

**CSc 255 Computer Graphics Applications (3)**

For students who wish to learn to use computer graphics in their own disciplines. Plotter and interactive graphic display characteristics and programming. Use of computer graphics facilities. Introduction to interactive graphic display characteristics. Credit not allowed for both CSc 255 and CSc 455. 3 lectures.

**CSc 304 Digital Computer Architecture (3)**

Comparison of various contemporary computer architectures as seen from the software/firmware/hardware levels. Variations in instruction sets, addressing techniques, data structures, input-output capabilities, networks. 3 lectures. Prerequisite: CSc 222 and EL 219.

**CSc 306 Minicomputers (3)**

Architectural features of current small computers. Instruction sets, addressing methods, input-output facilities, interrupt-driven software, minicomputer systems, operating systems, utilities. 3 lectures. Prerequisite: EL 219.

**CSc 309 Microcomputer Architecture and Programming (3)**

Comparison of architecture and instruction sets of microprocessors. Selection criteria and application of microprocessors. Use of application development aids. 3 lectures. Prerequisite: EL 219.

**CSc 310 Programming Language/One (PL/I) (3)**

Introductory and intermediate treatment of PL/I, its program formats, data forms, data transmission, internal manipulations, sequence control, and program organization. 3 lectures. Prerequisite: CSc 101 or equivalent.

**CSc 311 Numerical Engineering Analysis (3)**

Introduction to computer analysis techniques used in solving electrical engineering problems. Capabilities and limitations of various software packages used in electrical engineering. Numerical analysis techniques apply to linear and nonlinear electrical systems. 3 lectures. Prerequisite: CSc 101, Math 242, EE 212.

**CSc 319 Computer Simulation (3)**

Computer simulation and modeling of continuous systems. Applications to problems of design, analysis, and control. 3 lectures. Prerequisite: Math 133 or 242 and knowledge of Fortran programming.

**CSc 325 Job Control Language and Access Methods (3)**

Job Control Language for the various configurations of System/360-370 Operating Systems. The creation and maintenance of physical sequential, indexed sequential, and direct data sets using the various System/360-370 basic and queued access methods. Introduction to the utility programs. 3 lectures. Prerequisite: CSc 222.

**CSc 331 Numerical Linear Analysis (3)**

Introduction to methods currently available to engineers, scientists and mathematicians for dealing with systems of linear equations utilizing a digital computer. Solutions of systems of linear equations, calculation of matrix inverses, eigenvalues, and eigenvectors. Applications to problems in engineering and science. 3 lectures. Prerequisite: Math 133 or 143 and ability to program in Fortran.

**CSc 332 Numerical Nonlinear Analysis (3)**

Introduction to the solution of initial value problems for ordinary differential equations. Numerical solution of nonlinear algebraic equations. Interpolation of data, numerical integration and differentiation of functions. Practical applications and case studies. 3 lectures. Prerequisite: Math 242 and ability to program in Fortran.

**CSc 333 Numerical Solution of Ordinary Differential Equations (3)**

Numerical solution of initial and boundary value problems for ordinary differential equations. Introduction to finite difference methods. Numerical solution of systems of nonlinear algebraic equations. Practical applications and case studies. 3 lectures. Prerequisite: CSc 332.

#### CSc 340 Cobol Programming (3)

Structure of the Common Business-Oriented Language (COBOL). Coding fundamentals and program logic. Writing of complete Cobol programs applied to typical business data processing problems. 3 lectures. Prerequisite: Any computer programming course.

#### CSc 345 Data Structures (3)

Basic concepts of data, storage systems and their properties, data transmission, sequential and linked lists, tree structures, multilinked structures, accessing and traversal, applications to compiler design, list and string processing, sorting, and programming languages. 3 lectures. Prerequisite: At least two quarters of one or more programming languages.

#### CSc 350 Systems Analysis (3)

Analysis of administrative and management problems to develop understanding and improved solutions through application of computers. Computer simulation and modeling of discrete systems involving stochastic variables. 3 lectures. Prerequisite: Knowledge of Fortran programming, and Stat 211 or 321.

#### CSc 351 Programming Languages (4)

Formal languages, run time representation, structure of algorithmic languages, parameter passing between routines, storage allocation and mapping, and binding time. Adaptability of selected languages to various fields of application and language extensibility. 4 lectures. Prerequisite: CSc 222, 345.

#### CSc 352 Compilers and Interpreters (3)

Syntactic and semantic analysis. Intermediate translation forms. Generation of object code for compilers. Interpreter design. 3 lectures. Prerequisite: CSc 351.

#### CSc 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with not more than 2 units in any one quarter. Prerequisite: Permission of the department head.

#### CSc 402, 403 Foundation in Computer Science (5) (5)

Intensive courses to provide the foundation in computer science needed for entrance into the Master's degree program for students whose undergraduate training is not computer science. Fundamentals of computer organization, computer systems, languages, data structures, compilers and assemblers, job control and operating systems. 5 lectures. Prerequisite: Graduate standing and approval of the head of the department.

#### CSc 404 Telecommunications and Distributed Systems (3)

Multicomputer complexes, communications networks and distributed systems. Telecommunications protocols, security and fault tolerance, national and international standards, performance issues and topology considerations. 3 lectures. Prerequisite: CSc 304 or consent of instructor.

#### CSc 409 Applications of Microprocessors (3)

Design and capability of application development aids, assemblers and high level languages. Interrupt structure design. Introduction to microprogrammable microprocessors. 3 lectures. Prerequisite: CSc 309.

#### CSc 410 Computer Fundamentals for Educators (3)

For students who plan to utilize computers at the school or district level. Computer fundamentals. Developing skill in a basic computer language. Programming techniques with applications to education problem-solving strategies. 3 lectures. Prerequisite: junior standing.

#### CSc 411 Computer Applications in School Administration (3)

Applications of computer techniques to data processing and other management applications in the administration of schools and school districts. 3 lectures. Prerequisite: CSc 410.

**CSc 414 Computer Assisted Instruction (3)**

Techniques of utilizing the computer to assist individualized instruction. Comparison with other methods of programmed instruction. Hardware and software requirements of computerized classrooms for elementary, secondary, and college applications. 3 lectures. Prerequisite: Senior standing.

**CSc 419 Mathematical Programming (3)**

Extensions of linear programming, introduction to non-linear programming, dynamic programming and dynamic optimization procedures with industrial applications. 3 lectures. Prerequisite: CSc 219 and Math 133 or 143.

**CSc 431 Numerical Solutions of Partial Differential Equations (3)**

Numerical solutions of time dependent partial differential equations. Practical applications and case studies. 3 lectures. Prerequisite: CSc 333.

**CSc 440 Computer Based System Development (3)**

Techniques for the production of computer based systems. Software tools, estimating techniques, project organization and control, documentation, and system specification for large programs. 3 lectures. Prerequisite: CSc 345.

**CSc 445 File Management (3)**

Principles of file organization. Sequential, directory, hashed, and tree organized files. File handling utilities. Modern types of mass storage media. Systems of files. Selected case studies and applications. 3 lectures. Prerequisite: CSc 345.

**CSc 446 Database Systems (3)**

Principles of database systems. Hierarchical, network, and relational approaches. Data description and accessing languages. Data security and privacy. Database administration. Applications to decision support systems. Selected case studies. 3 lectures. Prerequisite: CSc 445.

**CSc 452 Computer Programming Systems (3)**

Design of assembly systems, macro instructions, program intercommunication and linkage. Structure and use of program libraries. Input and output programming systems, debugging systems and source language debugging. Assembly systems and software. Batch processing and executive systems. 3 lectures. Prerequisites: CSc 304, 345.

**CSc 453 Multi-programming and Multi-processor Systems (3)**

Interrupt, sequential, and multi-programming systems. Priorities and scheduling. Time sharing systems. Use of bulk memory. Simple two-processor systems and programming. System and language requirements. 3 lectures. Prerequisite: CSc 452 or equivalent.

**CSc 454 Operating System Implementation (3)**

Implementation of operating systems and operating systems modules. Measurement of operating system performance parameters. 3 lectures. Prerequisite: CSc 453.

**CSc 455 Computer Graphics (3)**

Applications for interactive graphic display systems and XY plotters. Design characteristics of graphical input/output systems. Experience in programming interactive graphic display systems. 3 lectures. Prerequisite: CSc 345.

**CSc 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**CSc 463 Undergraduate Seminar (2)**

Reports and discussions by students through seminar methods, based on their senior projects and on other topics relating to computer usage and programming which are of interest to persons preparing for a career in computer science. Offered only on a credit-no credit basis. 2 activity periods.

**CSc 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**CSc 519 Computer Modeling and Simulation I (4)**

Computational aspects of computer algorithms for computer modeling and simulation. High level languages for computer simulation. 4 lectures. Prerequisite: Knowledge of Fortran programming, Math 133 or 242, Stat 321, CSc 319 and CSc 350.

**CSc 520 Computer Modeling and Simulation II (4)**

Simulation methodology, simulation languages and applications of simulation in several applied areas. 4 lectures. Prerequisite: CSc 519.

**CSc 531 Numerical Solution of Algebraic Systems (4)**

Direct and iterative methods for computing solutions, eigenvalues, and eigenvectors of systems of equations. Emphasis on applications to elliptic and parabolic partial differential equations. 4 lectures. Prerequisite: CSc 333, Math 313.

**CSc 532 Numerical Solution of Differential Equations (4)**

Single step and predictor corrector methods for initial value problems. Two-point boundary value problems. Extrapolation methods. 4 lectures. Prerequisite: CSc 333, Math 313.

**CSc 541 Information Processing (4)**

Theory and fundamentals. Algorithm design and evaluation, advanced data structures, language structure, string manipulation, network and graph theoretic methods of analysis, file organization and management, internal and external sorting methods. 4 lectures. Prerequisite: CSc 352, 452 and 310, or CSc 403.

**CSc 542 Information Processing (4)**

Fundamentals and applications. Principles of system design, modularity and interfacing, effects of interactive systems, evaluation of information systems. Selected applications from large business or scientific data processing systems, real-time data acquisition systems, information retrieval, management information systems, and educational data systems. 4 lectures. Prerequisite: CSc 541.

**CSc 551 Computer Systems and Software (4)**

Comparison of language features and compiler techniques for higher level languages. Predicate calculus. List and string processing languages. Compiler-compiler concept and implementation. Simulation languages. 4 lectures. Prerequisite: CSc 352, 403.

**CSc 552 Computer Systems and Software (4)**

General concepts of computer architecture and operating systems. Design features of advanced computers, general time-sharing systems and schemes for dynamic memory allocation, scheduling and protection. Dynamic linkage between subroutines. Intercommunication between input/output and processors. 4 lectures. Prerequisite: CSc 453.

**CSc 560 Practicum in Computer Science (5)**

Documentation and solution of practical problems in computer science selected from business, industrial, and scientific organizations under guidance of lecturers from cooperating organizations and members of the computer science faculty. 1 lecture, 4 activities. Prerequisite: CSc 520 or 532 or 542 or 552.

**CSc 570 Selected Topics in Computer Science (1-3)**

Directed group study of selected topics for graduate students. Class schedule will list topics for selection. Topic credit limited to 9 units. 1 to 3 lectures. Prerequisite: Graduate standing and evidence of satisfactory preparation in computer science.

**CSc 590 Seminar in Computer Science (3)**

Current problems and research in the field of computer science through discussions and selected readings. Group study of selected advanced topics. 3 meetings. Prerequisite: Graduate standing.

**CSc 599 Thesis/Project (4-6)**

Individual research or activity under faculty supervision leading to an acceptable thesis or project. Prerequisite: Graduate standing and consent of instructor.

## **CONSERVATION**

**Cons 311 Introductory Conservation (3)**

Basic principles and problems of conservation. Organization, control and interrelationships of government and private agencies dealing with the conservation of natural resources. 3 lectures. Prerequisite: Junior standing and one course in Biological Sciences.

**Cons 422 Freshwater Fisheries (3)**

Freshwater fishes and fishery resources of the Pacific Coast. Identification, life history, ecology and economics of important western and local species. Field trips to various warm and cold water fishery facilities. 2 lectures, 1 laboratory. Prerequisite: Zoo 132, Zoo 322 recommended.

**Cons 431 Game Management (4)**

General principles, problems and techniques of increasing the harvest of waterfowl, upland game and big game. The identification and life histories of important western game species. Several weekend field trips. 3 lectures, 1 laboratory. Prerequisite: Bio 325 or ASci 229.

**Cons 433 Aquaculture (4)**

Biological, physical, chemical, and economic aspects of reproduction, development, growth, nutrition, and disease of fishes in culture. Modern methods and problems in the culture of warm water species, especially those suited to farm situations. 3 lectures, 1 laboratory. Prerequisite: Zoo 132 and Bio 334. Zoo 322 recommended.

## **CONSTRUCTION**

**Cstr 240 Additional Construction Laboratory (1-2)**

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

**Cstr 321 Concrete Technology (3)**

Study of modern concepts which form the basis for solutions to problems of concrete construction. Includes significant developments in concrete chemistry and strength theory from 1963 to present. Development of a rational basis for writing concrete specifications and for proportioning concrete mixes. 2 lectures, 1 laboratory. Prerequisite: ArcE 223, 301.

**Cstr 322 Concrete Formwork Design (2)**

Design, construction and economics of concrete formwork. Use of wood, steel, plastic and other formwork systems. Applications to special situations and techniques including precast and prestressed concrete. 1 lecture, 1 laboratory. Prerequisite: ArcE 321, 322.

**Cstr 341, 342, 343 Construction Practice (4) (4) (4)**

Steel, masonry and concrete structures. Emphasis on recently-developed building systems, equipment, materials and techniques. Related construction drawings and details, shop drawings and design of formwork. One designated field trip required. 1 lecture, 3 laboratories. Prerequisite: Arch 232, EDes 203, ArcE 223.

**Cstr 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.



**Cstr 412 Construction Regulations (2)**

Laws and legal problems related to the construction industry. Contractor's licensing law, labor laws, lien laws, and safety requirements. 2 lectures. Prerequisite: 4th year standing.

**Cstr 420 Construction Cost Estimating (2)**

Survey of methods and practices of construction cost estimating. Solutions to problems in estimating. For students not majoring in Construction. 1 lecture, 1 laboratory. Prerequisite: 4th year standing.

**Cstr 441, 442, 443 Construction Practice (2) (2) (2)**

Continuation of Cstr 343. Problems in quantity surveying, estimating. 2 activities. Prerequisite: Cstr 343.

**Cstr 451, 452, 453 Construction Laboratory (5) (5) (5)**

Comprehensive projects stressing decision making and design solutions to the problems in construction; team projects encouraged. Emphasis on critical path planning and cost control, job organization, scheduling and financing, field projects supervision, bidding procedures and construction law applications. 5 laboratories. Prerequisite: Cstr 343, ArcE 321, 322, 323, Stat 211, Phys 137.

**Cstr 461, 462 Senior Project (2) (2)**

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. Construction and team projects encouraged. To be completed in two consecutive quarters. 120 hours minimum total time. Credit/No Credit grading only. Prerequisite: Cstr 343.

**Cstr 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Cstr 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

## **CROP SCIENCE**

**CrSc 099 Principles of Insect Pest Management (4)**

Identification and control of common insect pests of agricultural crops and stored products. Safe use and handling procedures of insecticides and related materials. Natural, cultural, mechanical, and chemical controls of injurious insects and mites. 3 lectures, 1 laboratory. Not open to degree students for degree credit.

**CrSc 123 Forage Crops (4)**

Production, harvest, and utilization of principal California forage crops. Identification and utilization of forage plants studied in the field. Field trips to local areas. 3 lectures. 1 laboratory.

**CrSc 131 Introduction to Crop Science (4)**

Production principles for field and vegetable crops. Fundamental botany, taxonomy and cultural practices. Soil tillage, fertilization, seed selection planting and harvesting methods, irrigation, weed control, pest control, and crop rotation. Production practices for cotton. A field trip to a major California production area is required. 3 lectures, 1 laboratory. Credit will not be allowed for both CrSc 131 and CrSc 230.

**CrSc 132 Grain Crops (4)**

Production, adaptation, distribution, and utilization of major grain crops including wheat, barley, oats, corn, rice, sorghum, and rye. Field trips to major California cereal production areas. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or CrSc 230.

**CrSc 133 Row Crops (4)**

Adaptation, production, and utilization of major row crops such as potatoes, tomatoes, dry beans, and sugar beets. A field trip to a major California row crop production area is required. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or VgSc 230.

**CrSc 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**CrSc 221 Weed Control (4)**

Identification, life histories, and control of common, noxious, and poisonous California weeds. Weed control chemicals and equipment for cultivated crops, irrigation systems, range, wastelands. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing.

**CrSc 230 General Field Crops (4)**

Production, harvest, and use of important cereal and field crops in California. Production areas, crop rotations, disease and pest control. 3 lectures, 1 laboratory. Credit will not be allowed for both CrSc 131 and 230.

**CrSc 231 Commercial Seed Production and Processing (4)**

Production and processing of certified and commercial seed including seed analysis, germination, quality control, cleaning and storage techniques, and seed laws. 3 lectures, 1 laboratory. Prerequisite: CrSc 132 or 133.

**CrSc 304 Plant Breeding (4)**

Application of principles of plant improvement through selection, hybridization, and utilization of hybrid vigor. 3 lectures, 1 laboratory. Prerequisite: Bio 303.

**CrSc 305 Agricultural Inspection (3)**

Purpose and function of the State Department of Food and Agriculture, California Agriculture Code, and county departments of agriculture. Basic background to qualify students for the specific county inspector examinations. 2 lectures, 1 activity.

**CrSc 311 Applied Insect Pest Management (4)**

Principles of controlling insect pests including biological, cultural, physical, mechanical, and chemical controls. Identification of insects injurious to California field, fruit, and vegetable crops including stored products and livestock. Insecticide formulation and methods of application. 3 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

**CrSc 321 Advanced Insect Pest Management (4)**

Insecticide classification, insect toxicology, and resistance. Fate of pesticides in the environment. Alternate methods of insect control. Techniques of insect bioassay, insect and vertebrate toxicology, biological controls, insecticide residues. 3 lectures, 1 laboratory. Prerequisite: CrSc 311.

**CrSc 322 Crop Technology (3)**

Recent developments in technology relating to advancements in crop production and crop systems. 3 lectures. Prerequisite: CrSc 133, Bot 121 and junior standing.

**CrSc 323 Tropical Crop Production (4)**

Production distribution, adaptation and utilization of major field and vegetable crops of economic importance in tropical and subtropical areas. 3 lectures, 1 activity.

**CrSc 325 Hay and Processed Forage Crops (3)**

Intensive study of hay, dehydration and silage making procedures. Storage facilities, grades and market values, anti-oxidants and feed additives that affect bloat and feed quality. 2 lectures, 1 laboratory. Prerequisite: Chem 121.

**CrSc 326 Plant Protection Techniques (3)**

Plant protection methods and techniques. Pesticide formulation and evaluation of application results for uniformity, rate, and effective placement. Air and ground applications, calibrations. Federal, state, and local laws governing pesticide use and application equipment. 2 lectures, 1 laboratory. Prerequisite: CrSc 221, 311.

**CrSc 327 Vertebrate Pest Management and Control (3)**

Vertebrate pests injurious to agriculture crops, livestock, and stored products, with emphasis on ground squirrels, rats, mice, birds, gophers, and other animals. Life habits, identification, control methods, and materials. Related laws and regulations. 2 lectures, 1 laboratory.

**CrSc 330 Pasture Management (4)**

Identification, production, utilization of irrigated and non-irrigated pasture crops. A study of grazing systems and the merits of mixtures and non-mixtures. A field trip to a production area may be required. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or CrSc 230.

**CrSc 333 Nutriculture (4)**

Development, practices, history, and future of crop production using nutrient solutions. Research application, commercial applications, production problems, marketing, and economics. 3 lectures, 1 laboratory. Prerequisite: Chem 122, CrSc 133, SS 221 or consent of instructor.

**CrSc 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**CrSc 410 Crop Physiology (4)**

Practical studies in plant nutrition, soil-water-plant relationships, seed physiology, growth regulators, pesticide reactions, and controlled environments. 3 lectures, 1 laboratory. Prerequisite: SS 221, CrSc 131 or 230, and Chem 328.

**CrSc 411 Experimental Techniques and Analysis (4)**

Principal methods of experimental design and analysis of collected data. Field practice in planning and lay-out with emphasis on management of agronomic and soils experiments. 3 lectures, 1 laboratory. Prerequisite: Junior or senior standing and Math 103 or equivalent.

**CrSc 421 Oil and Fiber Crops (4)**

Culture, harvest, grading, and marketing of cotton, flax, safflower, castor beans, minor oil and fiber crops. Field trips to major centers of production and marketing are required. 3 lectures, 1 laboratory. Prerequisite: CrSc 133, 221 and Bot 121.

**CrSc 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**CrSc 463 Undergraduate Seminar (2)**

Oral presentation and leadership of group study on recent developments in the major field. 2 lectures.

**CrSc 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**CrSc 521 Advanced Field Crop Production (4)**

Production and management of field crops under both intensive and extensive cultural practices; interaction between the various growth factors at various levels of production and interaction of cultural practices and plant requirements. 3 lectures, 1 laboratory. Prerequisite: Permission of the instructor.

**CrSc 581 Graduate Seminar in Crop Production (3)**

Group study and oral reports on current technical problems and research results pertaining to field and vegetable crops production or marketing. 3 lectures.

## **DAIRY HUSBANDRY**

**DH 101 Dairy Feeds and Feeding (2)**

Identification and classification of feeds; simple use of food nutrients, protein, fat, and carbohydrates; methods of preparing feeds; relative values of common feeds for each class of livestock with special attention to dairy cattle, the use of byproduct feeds. 2 lectures.

**DH 102 Feeding Dairy Cattle (2)**

Balancing dairy cattle rations. Feeding practices and nutritional requirements. 2 lectures. Prerequisite: DH 101

**DH 121 Elements of Dairying (4)**

General introductory dairy course. General information on statistics and opportunities in the dairy industry. Composition and food value of dairy products. Common tests to determine quality of products. Principles and practices of the feeding and management of dairy cattle. 3 lectures, 1 laboratory.

**DH 133 Fitting and Showing Dairy Cattle (2)**

Selection, preparation, presentation of dairy cattle for shows, sales, and photographing. 1 lecture, 1 laboratory.

**DH 142 Dairy Cattle Selection (2)**

Selection of dairy cattle with consideration to breed characteristics and conformation. Evaluation of type characteristics. Correlation between type and production. 2 laboratories.

**DH 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**DH 221 Milk Production (4)**

Factors affecting milk production. Dairy production problems and methods. Practice in many of the frequently used dairy production skills. 3 lectures, 1 laboratory. Prerequisite: DH 102, 121, 142.

**DH 222 Commercial Dairy Herd Management (4)**

Commercial dairy practices from the standpoint of cost of feeding and management. Visits are made to successful dairy farms. 3 lectures, 1 laboratory. Prerequisite: DH 221.

**DH 230 General Dairy Husbandry (4)**

Selection, breeding, feeding, and management of dairy cattle. Composition and food value of dairy products. Dairy industry statistics and opportunities. Producing and handling products. A general course for other than dairy majors. 3 lectures, 1 laboratory.

**DH 233 Advanced Dairy Cattle Selection (2)**

Advanced practice in the comparative evaluation of dairy cattle. Detailed scoring and classifying cattle on conformation. Functional anatomy and relationship to production. Visits to breeding establishments and shows. 1 lecture, 1 laboratory. Prerequisite: DH 142.

**DH 301 Advanced Dairy Cattle Feeding (2)**

Nutrition requirements of dairy cattle. Successful, economical feeding practices. 2 lectures. Prerequisite: DH 102.

**DH 323 Breeds, Pedigrees and Management of Dairy Cattle (4)**

Origin of modern dairy cattle breeds, organization of cattle clubs. Breed families and herds. Practice in compiling pedigrees. Methods and problems in establishing and managing a purebred dairy herd. 3 lectures, 1 laboratory. Prerequisite: DH 221, 222.

**DH 330 Artificial Insemination (2)**

Techniques in the collection, evaluation, processing, storage and shipment of semen. Insemination procedures. Fertility problems. Record keeping. 1 lecture, 1 laboratory. Prerequisite: DH 121 or ASci 121, VS 123 or VS 099.

**DH 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**DH 422 Breeding and Selection of Dairy Cattle (4)**

Evaluation of inherited characteristics in dairy cattle from an economic standpoint. Proving and selecting sires and dams. 3 lectures, 1 laboratory. Prerequisite: Bio 303, DH 142.

**DH 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**DH 463 Undergraduate Seminar (2)**

Reports on student papers, bulletins, periodical articles, and dairy research experiments. Sources of dairy husbandry information. Practice in oral reporting. Late developments and research work in the dairy industry. 2 lectures.

**DH 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## **DAIRY MANUFACTURING**

**DM 132 Frozen Dairy Foods (4)**

Selection of ingredients, calculating, and processing ice cream, ice milk, and sherbet mixes. Equipment and methods required to process, freeze, package, and harden ice cream and related products. 3 lectures, 1 laboratory. Prerequisite: DH 121.

**DM 133 Market Milk (4)**

Composition and properties of fluid milk and its constituents. Equipment used to handle, process, and distribute fluid milk and related products. 3 lectures, 1 laboratory. Prerequisite: DH 121.

**DM 202 Dairy and Poultry Product Merchandising (3)**

Product promotion, advertising, merchandising. State and national programs. Independent advertising and sales promotion programs. 3 lectures.

**DM 220 Dairy Product Consumer Education (2)**

Consumer education in identification, selection, and nutritional value of dairy products. Comparison of dairy products with substitutes and imitations. Uses of dairy products in diets and home meal planning. Caloric values, chemical composition, and constituents of dairy products. 1 lecture, 1 activity.

**DM 230 General Dairy Manufacturing (4)**

Composition and properties of fluid milk and manufactured milk products. Processes and equipment involved in the manufacture of butter, cheeses, and other fermented dairy products, frozen, condensed, and dried dairy foods. Elective course for non-dairy students. Survey course for dairy husbandry majors. 3 lectures, 1 laboratory.

**DM 233 Dairy Foods Evaluation (2)**

Basic principles of sensory examination of dairy foods. Physiology of the various senses and their relationship to distinguishing the quality of dairy products by sight, flavor, body and texture. Product defects, causes, and methods of prevention. 1 lecture, 1 laboratory. Prerequisite: DM 133.

**DM 326 Fermented Dairy Foods (3)**

Methods, ingredients, and equipment used in the manufacture of fermented dairy products, such as sour cream, buttermilk, and yogurt. Plant practice and field trips to study commercial applications. 2 lectures, 1 laboratory. Prerequisite: Bact 221.

**DM 331 Condensed and Dry Milk (4)**

Processing, packaging, and marketing of evaporated and condensed milk and dry milk powders. Field trips are made to study commercial plants, methods and equipment. Mojonner analysis and other routine tests. 3 lectures, 1 laboratory. Prerequisite: DM 132, 133.

**DM 332 Dairy Inspection (3)**

California dairy codes and score cards used for dairy plants and farms. Quality tests of dairy products. Practice in inspecting and scoring dairy farms and factories. Organizational structure of inspection services. 2 lectures, 1 laboratory. Prerequisite: DM 133, Bact 221.

**DM 334 Cheese (4)**

Equipment and methods needed to manufacture, package, cure and market various types of cheese. Practice in the college creamery. 3 lectures, 1 laboratory. Prerequisite: Bact 221, DM 133.

**DM 336 Butter and Dairy Spreads (4)**

Equipment, ingredients, and methods needed to handle and manufacture various creams, butter, oleomargarine, and other dairy spreads. Practice in university creamery and field trips to observe commercial applications. 3 lectures, 1 laboratory. Prerequisite: DM 133.

**DM 431 Dairy Plant Management (4)**

Basic management principles applied to the Dairy Industry. Industrial organization and control. Dairy plant location, design facilities and layout. Elements of successful salesmanship, advertising, and marketing. Survey of overhead allocation and of financing and depreciation applied to the dairy industry. Study of significant operating ratios and comparative analysis of financial statements. 3 lectures, 1 laboratory. Prerequisite: Senior standing.

**DM 433 Dairy Equipment and Systems (4)**

Maintenance and minor repair of vacuum pumps, milk pumps, conveyor and product handling systems, and other specialized equipment. 3 lectures, 1 laboratory. Prerequisite: DM 133 and junior standing.

## **ECONOMICS**

**Econ 101 Introduction to Economics (2)**

The scope and methods of economic science, with emphasis on the relevance of economics to the overall functioning of society. 2 lectures.

**Econ 105 Consumer Economics (3)**

Consumer-producer relationships, money management, buying methods; investments, insurance, and housing; agencies that help the consumer. 3 lectures.

**Econ 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**Econ 201 Survey of Economics (3)**

Basic material covered in Principles of Economics, Econ 211, 212 in a less detailed and technical manner. For majors requiring one quarter of economics. Not open to students with previous credit in Econ 211 or 212 or equivalent. 3 lectures. Prerequisite: Sophomore standing. Successful completion of Freshman Composition recommended.

**Econ 211 Principles of Economics (3)**

Macro-economics: principles and applications in the theory of national income, output and employment. Determination and measurement of the national product; inflation; money, banking, monetary and fiscal policies. Not open to majors in Economics and Business. 3 lectures. Prerequisite: Sophomore standing. Successful completion of English composition recommended.

**Econ 212 Principles of Economics (3)**

Micro-economics: principles and applications in the theory of producer and consumer behavior, and the distribution of factor income with focus on the output market. Effect on the national economy. Not open to majors in Economics and Business. 3 lectures. Prerequisite: Econ 211 or consent of instructor.

**Econ 213 Principles of Economics (3)**

Principles and applications in macro and microeconomics; growth and development, comparative economic systems, international trade and current economic problems. 3 lectures. Prerequisite: Econ 211 and 212 or equivalent.

**Econ 221 Microeconomics (4)**

Rigorous examination of micro-economic analysis. Marginal analysis as related to consumer, producer, and factor behavior in determination of prices and output. An in-depth study of microeconomic principles. Not open to students with credit in Econ 212 or equivalent. 4 lectures. Prerequisite: Sophomore standing. Successful completion of freshman math and English recommended.

**Econ 222 Macroeconomics (4)**

Rigorous examination of macroeconomic analysis. Aggregate output, employment, prices, and economic policies for changing these variables. An in-depth study of macroeconomic principles. Not open to students with credit in Econ 211 or equivalent. 4 lectures. Prerequisite: Econ 221 and sophomore standing. Successful completion of freshman mathematics and English recommended.

**Econ 301 Introduction to Managerial Economics (3)**

Fundamental principles and analytical tools of economics useful in business decision making; applications to management through case study of actual business and managerial situations. 3 lectures. Prerequisite: Econ 212 or 221 or consent of instructor.

**Econ 304 Comparative Economic Systems (3)**

Analysis of economic principles and institutions applicable to capitalism, socialism, and communism. 3 lectures. Prerequisite: one course in principles of economics.

**Econ 306 Applied Forecasting (3)**

Causes and measurement of business fluctuations. Techniques of forecasting. 3 lectures. Prerequisite: one course in principles of economics.

**Econ 311, 312 Intermediate Microeconomics (4) (4)**

Economics of prices and markets. Demand and supply. Returns and costs, factor pricing and income distribution, welfare and economic progress. 4 lectures. Prerequisite: One course in principles of microeconomics; Math 221, 222 or equivalent; Stat 251, 252 or equivalent.

**Econ 313 Intermediate Macroeconomics (4)**

Economic activity related to production and resource use to meet goals of society. Income, employment, economic growth and progress of the United States and its regions. 4 lectures. Prerequisite: One course in principles of macroeconomics; Math 221, 222 or equivalent; Stat 251, 252 or equivalent; Econ 337.

**Econ 317 Development of Economic Analysis (3)**

Analysis of ideas related to the development of economic theory in the Western civilization from the Greeks through the classical, neoclassical, and Keynesian to the current post-Keynesian concepts. 3 lectures. Prerequisite: Junior standing and satisfactory completion of Econ 211, 212 or Econ 221, 222 or consent of instructor.

**Econ 323 European Economic History (3)**

Analysis of the growth and development of economic institutions in the European economies from about 1600 to present. 3 lectures. Prerequisite: One course in principles of economics.

**Econ 324 American Economic History (3)**

Topical economic analysis of major events and institutions of American economic history as viewed against their causes, origin and development. Economic development of America from an underdeveloped nation. Agriculture, transportation, monetary and banking policies, business, labor, and growth of governmental activities. 3 lectures. Prerequisite: one course in principles of economics.

**Econ 325 Underdevelopment and Economic Growth (3)**

Economic Development: the less developed world and the American interest. 3 lectures. Prerequisite: one course in principles of economics.

**Econ 334 Urban Economics (3)**

Application of basic tools of economic analysis to problems of urban regions. Causes and possible cures for inadequate growth rate, income levels, and the quality of life in urban regions. 3 lectures. Prerequisite: one course in principles of economics.

**Econ 337 Money, Banking and Credit (4)**

Principles and practices of monetary, banking, and credit institutions as applied to business activity and public policy. 4 lectures. Prerequisite: One course in principles of macroeconomics.

**Econ 339, 340 Econometrics (4) (4)**

Application of statistical methods useful in economics. The general linear regression model. Specific issues and problems related to economic models: multicollinearity, autocorrelation, heteroscedasticity, dummy variables, lagged variables, and simultaneous equation estimation. Application and evaluation of selected examples of empirical economic research. 4 lectures. Prerequisite: Stat. 322, Math 132 or 143 or 221, or consent of instructor.

**Econ 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.



**Econ 401 International Trade (3)**

Theory of comparative advantage, gains from trade, and recent developments in trade theory; examination of tariffs, quotas, exchange controls, other trade barriers and underlying policy issues; review of U.S. commercial policy, GATT, the common market, regional and world economic organizations. 3 lectures. Prerequisite: Econ 211, 212 or Econ 221, 222 or consent of instructor.

**Econ 402 Public Finance (3)**

Principles of government financing and its various economic and social effects: collecting, spending and administration of public funds, particularly at state and local levels. 3 lectures. Prerequisite: Econ 211, 212 or Econ 221, 222 or consent of instructor.

**Econ 403 Industrial Organization (3)**

Application of basic tools of economics to American Industry. Case studies of individual firms and industries. Performance of various business structures, such as monopoly and oligopoly. Effects of government regulation and antitrust policy. 3 lectures. Prerequisite: Econ 212, or 221 or consent of instructor.

**Econ 404 International Monetary Economics (3)**

Nature of international payments, U.S. balance of payments. Theory and practice of foreign exchange rate determination under the gold standard, paper standard, and IMF system; international money and capital markets; problems of international liquidity and monetary stability. 3 lectures. Prerequisite: Econ 211, 212 or Econ 221, 222 or consent of instructor.

**Econ 410 Cost-Benefit Analysis (3)**

Principles of rational decision making with respect to business and government spending. Measurement of costs and benefits, interest rates, and criterion selection. 3 lectures. Prerequisite: Econ 221 or 212; 311, 312 recommended.

**Econ 413 Labor Economics (3)**

Wage determination theory, basic economic factors that affect the labor movement, economic impact of union activities on employment, output, income, wages, prices, and national economic policy. 3 lectures. Prerequisite: Econ 212 or 221 or consent of instructor.

**Econ 414 Monetary and Fiscal Policies (4)**

National economic fluctuation models and related corrective monetary and fiscal policies on income, employment, output, growth and prices. 4 lectures. Prerequisite: Econ 313.

**Econ 433 Transportation Economics (3)**

Analysis of the allocation of resources to the U.S. transport sector and specific transport modes as a result of their natural economic characteristics and public policy. 3 lectures. Prerequisite: one course in principles of economics.

**Econ 461, 462 Senior Project (2) (2)**

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

**Econ 463 Undergraduate Seminar (2)**

Seminar in applications of economic theory with emphasis on current problems. 3 meetings. Prerequisite: Econ 462.

**Econ 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: consent of instructor.

**Econ 500 Independent Study (1-3)**

Advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Enrollment by petition. Prerequisite: Consent of the department head.

## EDUCATION

### Ed 139 Exploring Education Field Experience (1-3)

Determining abilities, interests, and personality factors for teaching and related positions in education. Supervised firsthand experience in elementary and secondary schools.

### Ed 203 Efficient Reading (2)

Development of reading efficiency required in modern business, industry, and the professions. 1 lecture, 1 activity. Credit-No Credit only.

### Ed 301 Multicultural Education in Public Schools (3)

Multicultural factors that influence learning in the public schools; professional responsibilities and legal requirements in the profession. 2 lectures; 1 activity. Prerequisite: Junior standing or permission of instructor.

### Ed 322 Community Laboratory (1-3)

Supervised learning experiences in cooperation with youth club activities, educational and community agencies. Application of knowledge and skills acquired in college classrooms. 1-3 activities. Total credit limited to 6 units. Prerequisite: Permission of instructor.

### Ed 323 Basic Motion Picture Techniques (3)

Planning and production of motion pictures. Writing, filming, editing, and sounding. Includes some basic photography and sound recording techniques. 2 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

### Ed 335 The Learning Process (3)

How and why students learn in school, motivation and classroom behavior, nature of the learning process and human development. Self evaluation of the prospective teacher. 3 lectures. Prerequisite: Junior standing.

### Ed 415 Early Childhood Interventions (3)

Significant early elementary school intervention programs, their philosophies and organizational designs. Study of educational needs, behavior and development of kindergarten and primary age children with regard to effect on readiness for learning. 3 lectures.

### Ed 421 Instructional Media Technology (3)

Visual and auditory methods and materials of value in classroom teaching in elementary and secondary schools. Lecture, lecture-demonstration, discussion, previewing, and laboratory work. Planning and correlating use of audiovisual techniques in the classroom. 2 lectures, 1 laboratory. Prerequisite: Ed 335 or consent of instructor.

### Ed 424 Organizing and Teaching Multiple Subjects (3)

Introduction to the organization, selection, presentation, application, and interpretation of subject matter in the basic curriculum areas. Course designed for students who will be teaching in elementary schools. 3 activities. Prerequisite: Ed 438.

### Ed 430 Preliminary Student Teaching (6)

Part-time assignment usually prior to Ed 440. Includes participation, teaching and allied activities under direction of a selected regular teacher in consultation with a university supervisor. Application for student teaching must be approved prior to enrollment. A grade below "C" is unacceptable for recommendation for a credential. Prerequisite: admission to teacher preparation program.

### Ed 434 Field Experience in Reading Methods (2)

Supervised field experience in the teaching of reading in a school setting. Seminars relating to instructional procedures. Prerequisite: Advanced standing.

### Ed 435 Methods of Teaching Reading (3)

Patterns of classroom organization, application of reading programs, approaches, modalities and methods in the classroom. 3 lectures. Prerequisite: Ed 434.

**Ed 436 Diagnosis, Prescription and Evaluation (2)**

Diagnosis of student learning problems. Prescription and direction of student learning programs. Evaluation of student achievement. 1 lecture, 1 activity. Prerequisite: Advanced standing.

**Ed 438 Instructional Processes (3)**

Development of skills in classroom communication, planning instruction, selection and use of instructional materials. Teaching strategies, guiding discussion, promoting critical thinking, problem-solving, effective questioning, creating a learning environment. Examination of various types of classroom organization. 3 activities. Prerequisite: Admission to teacher education program or permission of instructor.

**Ed 439 Supervised School Experience (2-4)**

Supervised observation and participation in public schools, including experiences as teacher aide or instruction assistant; seminars relating to instructional procedures. Prerequisite: Advanced standing.

**Ed 440 Student Teaching (12)**

Full-time assignment usually preceded by Ed 430. Includes teaching and allied responsibilities under direction of a selected regular teacher in consultation with a university supervisor. Application for student teaching must be approved prior to enrollment. A grade below "C" is unacceptable for recommendation for a credential. Prerequisite: Admission to teacher preparation program.

**Ed 441 Student Teaching Practicum (3)**

Practices and problems of student teaching. Current innovations in teaching procedures and materials. Taken concurrently with single subject student teaching. 2 lectures, 1 activity.

**Ed 442 Curriculum and Methods for Early Elementary Teachers (3)**

Objectives, methods, curriculum, acquisition of appropriate materials, and construction of instructional aids. 2 lectures, 1 activity. Prerequisite: Ed 415 or consent of instructor.

**Ed 443 Curriculum and Methods in Elementary School Language Arts (3)**

Methods and materials for teaching language usage, spelling, handwriting, listening and speaking. 3 lectures. Prerequisite: Advanced standing.

**Ed 444 Curriculum and Methods in Elementary School Science (3)**

Curriculum, methods, and teaching procedures in elementary school science. The California Science Program. 3 lectures. Prerequisite: Advanced standing and approval of credential advisor.

**Ed 445 Curriculum and Methods in Elementary School Social Studies (3)**

Curriculum, methods, and teaching procedures in elementary school social studies with emphasis on the California program. 3 lectures. Prerequisite: Advanced standing and approval of credential advisor.

**Ed 451 Senior Project—Practicum (3)**

Analysis of practices and problems of student teaching. Taken concurrently with Ed 440. Limited to B.A. in Liberal Studies credential candidates. Written paper or report required. 2 lectures, 1 activity.

**Ed 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Ed 480 Problems of Exceptional Children (3)**

Developmental and learning problems common to mentally, emotionally, socially, and physically handicapped children and youth. Legal basis for educational adjustments and program development. 3 lectures. Prerequisite: Ed 335.

**Ed 481 Curriculum and Methods for Special Education (3)**

Curriculum, methods and materials in the education of children and youth with learning disabilities, behavior disorders and educational retardation. 3 lectures. Prerequisite: Ed 480.

**Ed 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of the department head, the graduate major adviser and the supervising faculty member.

**Ed 501 Philosophy of Education (3)**

The function of philosophy; the meaning of education; significance of present philosophical points of view; education aims and values; democracy and education; the relationship of various philosophical outlooks to educational methods and subject matter. 3 lectures.

**Ed 503 Guidance Services (3)**

Philosophy and concepts and underlying guidance services. Procedures, techniques, and materials employed by counselors, teachers and others in meeting individual student needs. 3 lectures. Prerequisite: Psy 201 or 202.

**Ed 504 Measuring and Evaluating Learning (3)**

Assessing the results of instruction in terms of educational objectives, principles of test construction, criteria for test selection, analysis and interpretation of test results, application to various school subjects, use of other evidences of performance, and models for evaluating innovations and change. 3 lectures. Prerequisite: Psy 201 or 202.

**Ed 505 Minority Student Counseling and Guidance (3)**

Socio-psychological concepts of the minority culture. Effects of poverty and the significance of minority status. Counseling and guidance techniques, parent involvement, and community relations. 3 lectures. Prerequisite: Psy 202, Ed 503.

**Ed 507 Staff Administrator Relationships (3)**

Principles and practices of personnel administration in school systems: recruitment and selection of personnel; job descriptions and role expectancies; job rewards, benefits, and incentives; rules, regulations, and policies; negotiations and grievance procedures; formal and informal communications; professional ethics and codes of behavior. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

**Ed 508 Educational Sociology (3)**

Sociological backgrounds of school children; effects of social, economic, and political trends and issues on education; problems of leisure, recreation, and occupations; modern interpretations of democratic ideology. Sociological problems are utilized to define the social objectives of the school. 3 lectures.

**Ed 510 School Finance and Business Management (3)**

Financial administration of public schools in California. Principles of school support, sources and methods of apportioning funds to school districts. Development of budgets; implications for educational needs at the district, school and classroom levels. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

**Ed 511 School Law (3)**

Legal aspects of school administration, including principles embodied in constitutional, statutory and administrative law, common law, and court decisions with implications for administration and operation of public schools in California. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

**Ed 512 School Administration (3)**

Principles and practices of organizing and administering elementary and secondary schools, including leadership, decision-making processes, human relations, instructional problems, special services, school plant management, educational planning for change, and staff development. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

**Ed 513 Federal, State, County, and District School Administration (3)**

Overview of public education in relation to the formal organization and administration at federal, state, intermediate and local district levels, and the influences upon education exerted by political, social, economic and religious groups and organizations. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

**Ed 514 Teaching Reading to Bilingual Students (3)**

Principles, procedures and materials for teaching reading to bilingual students coupled with diagnostic and prescriptive methods for understanding reading problems of the bilingual student. 3 lectures. Prerequisite: Ed 434.

**Ed 515 Curriculum Development (3)**

Strategies for curriculum development in elementary and secondary schools: curriculum models, rationales, innovations and trends; leadership for curriculum study; curriculum design and instructional strategies; and assessing effects of curriculum and instructional change upon learning. 3 lectures.

**Ed 516 Supervision of Instruction (3)**

Principles and techniques of educational leadership in improving teacher-learner relationships in elementary and secondary schools; organizing, equipping and staffing classes; communicating with individuals and groups; in-service education programs and activities; curriculum development and implementation; and program and staff evaluation. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

**Ed 517 School-Community Relationships (3)**

Strategies for community action between educational institutions and their respective publics. Establishing working relationships with other educational institutions; children and youth; parents and home neighborhoods; and politics and community power structures. Cooperative efforts in resolving contemporary urban and rural community problems. 3 lectures.

**Ed 518 Diagnosing Reading Problems (3)**

Reading problems in the schools including diagnosis of reading deficiencies, remediation, and suitable reading material. 3 lectures. Prerequisite: Ed 434, 435, 440, or permission of instructor.

**Ed 519 Teaching the Gifted Child (3)**

The nature of the growth and development of gifted children, including physical, social, and achievement aspects. Methods of identifying giftedness, gifted children, and children with special abilities. Study of selected programs for teaching gifted children in California and other states. 3 lectures.

**Ed 520 Reading Programs (3)**

School reading programs and classroom organization. Application of research findings to teaching reading. Survey of innovative programs in elementary and secondary school reading. For teachers and supervisors. 3 lectures. Prerequisite: Ed 434, 435 or permission of instructor.

**Ed 521 Teaching the Culturally Different (3)**

Cultural factors that inhibit learning in the school; problems and needs of the disadvantaged child; classroom procedure and materials to facilitate learning and increase educational achievement; preparation for teaching in depressed areas. 3 lectures. Prerequisite: Graduate standing.

**Ed 522 Teaching Reading in the Secondary Schools (3)**

Principles, procedures, and materials for improving reading in the subject matter areas with students of different backgrounds and abilities in grades 7 through 12. 3 lectures. Prerequisite: Ed 434, 435, 440, or permission of instructor.

**Ed 523 Remedial and Special Education (3)**

Theory and practice of diagnosing educational and psychological difficulties affecting the ability of children to profit from education. Case study and case conference approaches to understanding and assisting children with learning difficulties. 3 lectures. Prerequisite: Ed 503, Psy 432.

**Ed 524 Investigative Techniques (3)**

Principles and methods of planning a research proposal in educational and related community settings with emphasis on educational data and analysis techniques. 3 lectures. Prerequisite: Math 100, Psy 201 or 202.

**Ed 525 Group Guidance and Counseling (3)**

A study of group counseling research, techniques and evaluation with emphasis on practical application in educational and community settings. 3 lectures. Prerequisite: Ed 503.

**Ed 526 Advanced Clinical Experience in Reading (3-6)**

Supervised diagnosis and treatment of reading disability cases referred to the University by counselors, parents, teachers, and pupils themselves. Weekly interviews with school students, and seminars for discussion and analysis of current cases. Prerequisite: Ed 518 and permission of instructor.

**Ed 527 Atypical Learning Patterns (3)**

Classroom techniques for identification, assessment, and remediation of learning disabilities. Educational implications of the integrative function of motor, sensory, and perceptual of learning-handicapped children. 3 lectures. Prerequisite: Ed 436 and Ed 481.

**Ed 528 Advanced Counseling Critique (3)**

Advanced practice in vocational, personal, and educational counseling for students in the pupil personnel program. Counseling theory and procedure, educational and career planning. Application of theory to practical counseling situations. 3 lectures. Prerequisite: Ed 503, 525.

**Ed 529 Supervision of Vocational and Practical Arts Education (3)**

Methods of designing and implementing programs of vocational and practical arts education (applied arts) including agriculture, business, diversified co-operative, distributive, work experience education, homemaking, industrial arts, and trade technical education. 3 lectures.

**Ed 539 Educational, Occupational and Community Information (3)**

Collecting occupational, educational and community information including community resources such as agencies and organizations that provide services to individuals or groups. Sources and techniques of collecting and imparting such information stressed. 3 lectures. Prerequisite: Ed 503.

**Ed 540 Appraising Career Development (3)**

Appraisal procedures and theory in career guidance and counseling. Synthesis of personal and social data to diagnose and predict career development and choice. 3 lectures. Prerequisite: Ed 503.

**Ed 541 Administration of Pupil Personnel Services (3)**

Organization of pupil personnel services programs, their administration, their evaluation. Use of community resources and a study of laws relating to children and child welfare. 3 lectures. Prerequisite: Ed 503.

**Ed 542 Gender Stereotyping in Education (3)**

Sex role stereotyping in public schools and related community agencies; issues, career planning, decision making, legal considerations, and the developmental process. 3 lectures.

**Ed 546 Supervised Field Experience, Guidance and Counseling (3-12)**

Practical application of guidance services and counseling in public schools, colleges, and related community settings. Weekly seminars with University staff included. Prerequisite: Consent of Pupil Personnel Services Committee one quarter prior to enrollment.

**Ed 550 Career Education (3)**

Curriculum and purpose of career education in elementary and secondary schools and higher education. 3 lectures.

**Ed 564 Reading Process (3)**

Physiological, psychological and psycholinguistic components of the reading process. 3 lectures. Prerequisite: Ed 434, 435.

**Ed 566 Remediation of Reading Problems (3)**

Interpreting diagnostic results and prescribing remediation for specific reading problems within classrooms and special reading centers. 3 lectures. Prerequisite: Ed 514.

**Ed 570 Disruptive Behavior in the Classroom (3)**

Basic strategies for facilitating social-emotional techniques which shift disruptive behavior to appropriate behavior. 3 lectures. Prerequisite: Student teaching.

**Ed 580 Advanced Clinical Experience in Special Education (6)**

Clinical experience with individuals and small groups with learning disabilities. A multidimensional approach to treatment after careful and intensive diagnosis of problems. Prerequisite: Ed 481, 523.

**Ed 581 Graduate Seminar in Education (1-3)**

Group study of contemporary problems in education. Trends, developments, and issues. Total credit limited to 6 units. Prerequisite: Graduate standing.

**Ed 588 Administrative Services Field Work (3-6)**

Supervised field work in school administration at the elementary or secondary level; specific assignments made to cover important elements of school administration. Repeatable to maximum of 12 units. Prerequisite: consent of instructor.

**Ed 599 Thesis or Project (3) (3)**

Completion of a thesis or project pertinent to the field of education. Prerequisite: Consent of graduate committee and supervising faculty member(s).

## **ELECTRICAL ENGINEERING**

**EE 110 Orientation (1)**

Familiarization with the field of electrical and electronic engineering. 1 lecture.

**EE 112 Introduction to D-C Circuit Analysis (2)**

Definitions and units. Laws and simple circuits. Techniques of circuit analysis. 2 lectures. Prerequisite: EL 111 or consent of instructor and Math 142 or equivalent.

**EE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**EE 201 Electric Circuit Theory (3)**

Fundamental electric laws. Electric circuits and circuit theorems. Analysis of alternating current, single and three phase circuits using symbolic method (complex phasors). Coupled circuits and transients. For non-electrical engineering majors. 3 lectures. Prerequisite: Math 242, Phys 133.

**EE 211, 212 Electric Circuit Analysis (3) (3)**

Transient and steady state analysis of linear direct and alternating current circuits by mesh and nodal methods. Network theorems, duality, phasor and complex frequency concepts. Magnetically coupled circuits. 3 lectures. Prerequisite: Math 143 or equivalent and EE 112.

**EE 231 Electric Machines (3)**

Review of d.c. and a.c. electric circuit principles. Introduction to polyphase a.c. circuits. Physical and electrical characteristics of the more common type of d.c. and a.c. machines. Starting and reversing methods for machines. Basic transformer connections and usage. Not for engineering majors. 3 lectures. Prerequisite: ETEL 126 or equivalent.

**EE 241, 242 Electric Circuits Laboratory (1) (1)**

Steady-state and transient electric circuit behavior. Data collection and laboratory observation and note recording technique. Emphasis on the laboratory notebook. 1 laboratory. Concurrent or prerequisite: EE 211, 212.

**EE 261 Electric Circuits Laboratory (1)**

Direct current, steady state sinusoidal, and transient circuits. General networks. Instrumentation techniques and data interpretation. 1 laboratory. Concurrent or prerequisite: EE 201.

**EE 271 Electric Machines Lab (1)**

Transformers, d.c. and a.c. rotating machines and evaluation of operating characteristics of these devices. 1 laboratory. Concurrent or prerequisite: EE 231.

**EE 301 Network and System Analysis (3)**

Fourier analysis. Fourier and Laplace transform applications. Transient analysis. Transfer functions. Two-port parameters, pole-zero locations and system response. Development and use of Bode plots. 3 lectures. Prerequisite: EE 212, Math 318.

**EE 302 Linear Control Systems (3)**

Automatic feedback control systems. Analysis of linear dynamic systems. 3 lectures. Prerequisite: EL 301, 325.

**EE 303 Power Transmission (3)**

Transmission line parameters and characteristic constants. Power and signal transmission. Reflection, impedance matching, and transmission systems. 3 lectures. Prerequisite: EE 301.

**EE 325 Energy Conversion Electromagnetics (3)**

The fundamentals of electro-mechanical energy conversion. Magnetic circuits and electro-magnetic devices. Theory of operation and operating characteristics of transformers, d.c. machines and a.c. induction and synchronous machines. 3 lectures. Prerequisite: EE 201 or EE 212.

**EE 341 Advanced Circuits Laboratory (1)**

Fourier analysis. Development and use of analog simulation methods, pole-zero locations and Bode plots. 1 laboratory. Concurrent or prerequisite: EE 301.

**EE 342 Control Systems Laboratory (1)**

Laboratory work in feedback control systems. 1 laboratory. Concurrent or prerequisite: EE 302, 341, 365.



**EE 343 Power Transmission Laboratory (1)**

Power transmission lines. Load study of power transmission networks by using digital computers and a.c. network analyzer. 1 laboratory. Concurrent or prerequisite: EE 303.

**EE 365 Energy Conversion Laboratory (1)**

Single phase and three-phase transformers. Starting of large rotating machines, evaluation of characteristics of rotating machines. 1 laboratory. Concurrent or prerequisite: EE 325.

**EE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

**EE 406 Power System Analysis I (4)**

Introduction to electric power systems. Representation of power systems and components. One line diagrams and per unit calculations. Power limits and stability, system model representation of the synchronous machine, symmetrical faults, electrical insulation, grounding. 4 lectures. Prerequisite: EE 303.

**EE 407 Power Systems Analysis II (4)**

System protection, relays and relay systems, faults, load flow calculation, computer solutions, power system instrumentation and measurement techniques. 4 lectures. Prerequisite: EE 406.

**EE 410 Power Control I (4)**

Power semiconductor devices. Theory of power diodes, SCR, Triac, Diac, Unijunction transistor, etc., as a modeling of diode and SCR circuits, SCR trigger circuits, analysis of SCR circuit in rectifiers, inverters, and cycloconverters. 3 lectures, 1 laboratory. Prerequisite: EE 325, EL 309.

**EE 411 Power Control II (4)**

Analysis of d.c. and a.c. motors controlled by rectifiers, inverters, and cycloconverters; modeling of rectifier—d.c. motor systems; modeling of inverter—induction motor drive system; regenerative braking; electric propulsion; analog and digital computer study of motor control system. 3 lectures, 1 laboratory. Prerequisite: EE 410.

**EE 414 Direct Energy Conversion (3)**

Direct energy conversion, and storage, with consideration of resources, batteries, fuel cells, thermoelectricity, thermionic generators, solar energy, cells, MHD, power generation, and related topics. 3 lectures. Recommended as a complement to ME 415. Prerequisite: ME 302.

**EE 417 Alternating Current Machines (4)**

Alternating current machines. Generalized, operational and dynamic analysis. Unbalanced operations. 3 lectures, 1 laboratory. Prerequisite: EE 325, 365.

**EE 419 Nuclear Power Plant Instrumentation and Control (3)**

Block diagram transfer function representation of nuclear power plants. The control problem. Instrumentation practices in nuclear power plant design. Design and use of instrumentation sensors and modules in plant safety and control systems. 3 lectures. Prerequisite: EE 302, EL 309 or ME 422, EL 321 or equivalent.

**EE 432 Control systems Engineering (3)**

An advanced course in analysis and design of control systems based on root-locus, frequency domain and computer approach. Non-linear sampled data and self-adaptive systems. 3 lectures. Prerequisite: EE 302, EL 309 or consent of instructor.

**EE 444 Power Systems Analysis (1)**

Solutions of unsymmetrical fault and stability problems on the a.c. analyzer. 1 laboratory. Concurrent: EE 407.

**EE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: EE 325, EL 309, EL 334.

**EE 463 Undergraduate Seminar (2)**

Discussion of new developments in the fields of power systems and control. Fields of employment and job considerations. Credit/No Credit grading. 2 meetings. Prerequisite: senior standing.

**EE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**EE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**EE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**EE 511 Electric Machines Theory (3)**

Advance topics in electric machines theory. Introduction to Park's transformation. analysis of electric machines using Kron's generalized concept. Excitation systems. 3 lectures. Prerequisite: EE 325 or equivalent.

**EE 513, 514 Control Systems Theory (3) (3)**

State variables of open loop and closed loop dynamic systems. Mathematical modes. Concepts of sensitivity, controllability and observability. Discrete control. Stability by Lyapunov's functions. Adaptive and optimal control. Bellman's dynamic programming and Pontriagin's maximum principle. Random processes, and stochastic control. 3 lectures. Prerequisite: EE 302 or equivalent and consent of the instructor.

**EE 518 Advanced Power System Analysis (3)**

Symmetrical Components. Unbalanced faults. Analysis by digital computer simulation. Load flow studies. Elements of power system stability. 3 lectures. Prerequisite: EE 406 or equivalent.

**EE 519 Power System Design (4)**

Design studies involving aspects of an electric power system. Current industrial designs. Simulation techniques used extensively. 4 lectures. Prerequisite: Engr 518.

**EE 525 Stochastic Processes for Engineers (3)**

Stochastic processes used in the solution of engineering problems. Stationary processes and power spectra; Gaussian processes, Poisson processes, Marhov and Semi-Marhov processes. Applications to the problems of filtering and prediction (Wiener & Kalman filters), and to the problems of queuing traffic congestion, flow of material and equipment in a system. 3 lectures. Prerequisite: Stat 321, EL 414 or equivalent and consent of instructor.

**EE 527 Advanced Network Theory (3)**

Circuits, matrices, and linear vector spaces; linear graph theory; state equations for linear networks in normal form; eigenvalues and eigenvectors; reciprocal networks; normal modes. 3 lectures. Prerequisite: EE 301 or equivalent and consent of instructor.

## ELECTRONIC ENGINEERING

### EL 111 Introduction to Electronic Instrumentation (1)

Measurement techniques, use of power supplies, meters, signal generators, oscilloscopes, VTVM, etc. 1 laboratory.

### EL 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

### EL 207 Introduction to Electric and Magnetic Fields (3)

Introduction to fundamental physical concepts underlying electricity and electronics, with particular reference to basic electric and magnetic field theory. Engineering applications of electric and magnetic fields. 3 lectures. Prerequisite: Phys 131, Math 143.

### EL 208 Electronic Devices (3)

Internal operation, terminal characteristics and models of diodes, transistors (bipolar and field-effect), SCR's and optical devices (LED's and phototransistors). 3 lectures. Prerequisite: Sophomore standing.

### EL 219 Logic and Switching Circuits (3)

Modulo-N arithmetic and digital coding techniques. Fundamentals of Boolean Algebra and minimization techniques. Multiple function synthesis using ROM's and PLA's. Combinational circuit design as it applies to computers. Sequential circuit elements, flip-flops, counters and shift-registers. Introduction to state machine analysis. 3 lectures. Prerequisite: CSc 101.

### EL 248 Electronic Devices Laboratory (1)

Experimental determination of device characteristics and models. 1 laboratory. Concurrent: EL 208.

### EL 303 Signal Transmission (3)

Distributed constants and traveling waves. Transmission line parameters and characteristic constants. Lines with and without reflection. Pulse transmission. Smith Chart, coaxial lines. Measurements, impedance matching, transmission systems. 3 lectures. Prerequisite: EE 301.

### EL 305 Introduction to Digital Circuits (4)

Solid-state devices and circuits used in digital computer electronics. Diode and transistor switching action, operation of multivibrators (flip-flop) circuits. Integrated circuit fabrication and operation. For Computer Science majors. 3 lectures, 1 laboratory. Prerequisite: Phys 133, EL 219.

### EL 307 Digital Integrated Electronics (3)

Integrated logic circuits: RTL, DTL, TTL, I<sup>2</sup>L, MOS, CMOS, interfacing different logic families. 3 lectures. Prerequisite: EL 208.

### EL 308 Electronic Circuits (3)

Analysis and design of linear small-signal amplifiers, tuned and power amplifiers. 3 lectures. Prerequisite: EE 301, EL 307.

### EL 309 Integrated Electronic Circuits (3)

Operational amplifiers. Analysis and design of feedback amplifiers, oscillators, and power supplies. Waveshaping. Emphasis on integrated circuit implementation. 3 lectures, Prerequisite: EL 302, EL 308.

### EL 313 Analog Computer Techniques (3)

Course designed for mathematics, science and engineering majors other than electronic and electrical. Fundamental principles of analog computers, field of application in science and engineering. Programming techniques. Output devices. Simulation of linear and non-linear systems. 2 lectures, 1 two-hour laboratory. Prerequisite: Math 242.

**EL 314 Applied Electronics for Non-Engineers (4)**

Basic electronic principles, digital, analog, transducers and servo-systems used in scientific instrumentation. Designed for science students with minimal background in electronics. 3 lectures, 1 laboratory. Prerequisite: Math 120 and junior standing or consent of instructor.

**EL 319 Digital System Design (3)**

Introduction to finite automata theory and the design of digital systems utilizing state-machines, analysis and synthesis of state-machines. Design of synchronous, asynchronous, and pulse made sequential circuits. The role of the microprocessor in implementing state-machines. Trade-offs between system design utilizing hardware, firmware and microprocessors. 3 lectures. Prerequisite: EL 219, EL 307.

**EL 321 Electronics (3)**

Semiconductor electronic devices and circuits. Rectifiers, amplifiers, feedback oscillators, pulse forming and shaping, frequency response, modulation, detection and computer logic circuits. Not for electronic or electrical engineering majors. 3 lectures. Prerequisite: EE 201.

**EL 327 Electronic Instrumentation and Measurement (4)**

Principles and characteristics of instruments and instrumentation systems; analog and digital transducers; A/D conversion; data and signal transmission and amplification problems. Low level signal, high frequency signal, and high accuracy signal measurement problems. Automated instrumentation systems. 3 lectures, 1 laboratory. Prerequisite: EE 301, EL 308.

**EL 328 Discrete Time Systems (4)**

Introduction to the essential theories and techniques of discrete modeling for modern digital processing, with applications computer control, biological systems, economic systems and digital filtering. 3 lectures, 1 laboratory. Prerequisite: Junior standing in Engineering or Computer Science or consent of the instructor.

**EL 334 Electromagnetic Fields I (3)**

Advanced treatment of static vector electric and magnetic fields and their sources. Magnetic fields in ferromagnetic materials. Laplace's and Poisson's equations and boundary value problems. 3 lectures. Prerequisite: Math 318, EL 207.

**EL 343 Signal Transmission Laboratory (1)**

Impedance measurements, traveling-wave phenomena in transmission lines, impedance matching. 1 laboratory. Concurrent or prerequisite: EL 303.

**EL 347 Digital Integrated Electronics Laboratory (1)**

Experimental techniques for semiconductor devices: junction diodes, junction transistors, field-effect transistors and other solid state devices. 1 laboratory. Concurrent or prerequisite: EE 307.

**EL 348 Electronic Circuits Laboratory (1)**

Design, construction and testing of solid state amplifier to meet stated specifications. 1 laboratory. Concurrent or prerequisite: EL 308.

**EL 349 Integrated Electronic Circuits Laboratory (1)**

Design of electronic subsystems using integrated circuits. 1 laboratory. Concurrent or prerequisite: EL 309.

**EL 361 Electronics Laboratory (1)**

Rectifiers, amplifiers, feedback, oscillators, and digital logic circuits. 1 laboratory. Concurrent or prerequisite: EL 321.

**EL 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**EL 401 Electromagnetic Fields II (3)**

Time changing electric and magnetic fields. Maxwell's equations, with the relationship between field and circuit theory. Plane waves in dielectric and conducting media. Selected topics from wave polarization, reflection and refraction. Transmission line, wave-guide and antenna concepts. 3 lectures. Prerequisite: EL 334.

**EL 402 Microwave Engineering (3)**

Application of Maxwell's equations and boundary value problems to wave guide structures. Microwave equivalent circuit theorem. Passive microwave devices including treatment of microwave propagation in ferrites. 3 lectures. Prerequisite: EL 401.

**EL 404 Microprocessor System Design Methodologies (3)**

Classification and functional configurations of existing microprocessors and analysis of hardware system designs and system economics. Interface design techniques utilizing programmable I/O interfaces, real-time clocks, interrupts, and DMA channels. Representative applications. 3 lectures. Prerequisite: EL 319, EL 407, CSc 306, or consent of instructor.

**EL 405 Advanced Amplifier Theory (3)**

Analysis and design of modern electronic amplifiers and amplifier systems with advanced techniques. Small signal tuned amplifier design utilizing both discrete and integrated devices. VHF, UHF amplifier design using Y and S parameters. Noise analysis. 3 lectures. Prerequisite: EL 303, 309.

**EL 407 Digital Computer Subsystems (3)**

Design of registers, counters, sequencers, accumulators, encoders, decoders, memories, and other computer subsystems. Use of modern techniques and devices in implementation. Consideration given to cost, speed, and dependability. 3 lectures. Prerequisite: EL 309, 319.

**EL 408 Digital Computer Systems (3)**

Design and interconnection of various parts of a digital computing system. Design and implementation of micro-programming. Use of micro-processors in developing control circuitry for the main frame of a modern computer. 3 lectures. Prerequisite: EL 407, and CSc 306 or consent of instructor.

**EL 409 Computer Peripheral Interfacing (3)**

Hardware interfacing of a computer with external devices and systems, interfacing of common peripheral devices. 3 lectures. Prerequisite: EL 407.

**EL 411 Network Synthesis and Filter Design Fundamentals (3)**

Modern approach to network synthesis. Network functions. Foster and Cauer canonical synthesis. Transfer functions and transfer function synthesis. Approximation theory. Butterworth and Chebyshev filter design. Introduction to active filter concepts. 3 lectures. Prerequisite: EE 301.

**EL 412 Analog Computation and Simulation (3)**

Development of the concepts of analog computation and simulation, including system modeling, programming and scaling techniques. Application to problems in engineering and science, including some treatment of non-linear techniques; actual practice. 2 lectures, 1 two-hour activity. Prerequisite: EE 302, 342, EL 308.

**EL 413 Analog Integrated Circuits (3)**

Analysis and design of analog integrated circuits. DC and AC designs, feedback techniques, and noise in integrated circuits. Design monolithic operational amplifier with computer simulation programs. 3 lectures. Prerequisite: EL 309.

**EL 414 Signal Processing (3)**

Analog modulation, digital modulation, random variables and random processes in linear systems, signal detection and estimation. 3 lectures. Prerequisite: EE 302.

**EL 415 Communication Systems Design (3)**

Design of modern electronic communication and telemetry systems. Emphasis: practical implementation and comparison of various modulation systems. 3 lectures. Prerequisite: EL 309, EL 414.

**EL 416 Digital Signal Processing (4)**

Design of digital signal processing systems. The theory with applications from radar, sonar, speech, music, seismic and medical signal processing is presented. System design is implemented on the general purpose digital computer with special purpose digital hardware and software. 3 lectures, 1 laboratory. Prerequisite: EL 414.

**EL 420 Solid State Physical Electronics (3)**

Fermi-Dirac statistics, mobility and diffusion in semiconductors, temperature dependence of carrier concentration, continuity equation, effects of doping gradients, metal semiconductor contacts, photovoltaic and thermo-electric effects. 3 lectures. Prerequisite: EL 208, Phys 211.

**EL 421 Solid-state Microelectronics (3)**

Systems development and reliability considerations. The physical basis of micro-electronics. Properties of surfaces and thin films. Rectification and pn junction systems. Fabrication techniques. Miniature and thin-film circuits. Solid-state circuits and multiple devices. 3 lectures. Prerequisite: EL 309.

**EL 423 Microwave Electronics (3)**

Reflex Klystron oscillators, Klystron amplifiers traveling wave tubes. GUNN, IMPATT, TRAPATT and BARRIT oscillators. Cylindrical resonators and coupled wave theory. 3 lectures. Prerequisite: EL 401.

**EL 424 Antenna Theory and Application (3)**

Linear antenna theory. The antenna as a matching device. Antenna directivity, gain, efficiency, resistance, aperture, and reciprocity. Application of antenna theory to various types of antennas. 3 lectures. Prerequisite: EL 401.

**EL 425 Active Network Synthesis (3)**

Theory and design of active RC networks with filter applications; controlled source variable-gain, infinite-gain, gyrator, and state-variable realizations; sensitivity analysis and consideration; and applied synthesis techniques for various classes of filters. 3 lectures. Prerequisite: EE 302, EL 309.

**EL 428 Senior Systems Design (1-3)**

Application of engineering systems and analysis to design problems. Creative thinking emphasized. Group and individual assignments. 1-3 activity periods. Prerequisite: Senior standing in Electronic or Electrical Engineering or consent of instructor.

**EL 430 Computer-Aided Circuit Design (3)**

Analysis and design of active and passive electronic circuits using digital computers. Graphic terminal and time-sharing systems. Survey of available CAD programs and techniques. Applications of ECAP, SPICE and other programs for dc, ac and transient analysis, including tolerance, sensitivity, optimization and device modeling. 3 lectures. Prerequisite: CSc 311, EL 309.

**EL 441 Microwave Laboratory (1)**

Experimental investigation of vacuum-tube and solid state microwave sources, crystal and power detectors, coaxial cables, directional couplers and n-port devices. Measurement of SWR by slotted line and reflectometer techniques. Techniques for measurement of attenuation, frequency and power. Modulation techniques and spectrum analysis. 1 laboratory. Prerequisite: EL 303, 401.

**EL 444 Network Synthesis and Filter Design Lab (1)**

Modern network synthesis; network driving point and transfer function synthesis; design, construction and testing filters of the Butterworth and/or Chebyshev kind—lowpass, band-pass, band elimination and highpass filters. 1 laboratory. Concurrent or prerequisite: EL 411.

**EL 445 Advanced Amplifier Design Laboratory (1)**

Experimental investigation employing advanced techniques. Design of electronic amplifiers and amplifier systems utilizing recently developed components. 1 laboratory. Concurrent or prerequisite: EL 405.

**EL 446 Microprocessor Interfacing Laboratory (1)**

Design and construction of selected digital systems. Utilization of superstrip boards to construct MSI, LSI based logic circuits. Interfacing of student built systems with several representative microprocessors. Hardware/software performance evaluation of microprocessor interfacing techniques. 1 laboratory. Prerequisite: EL 404 concurrent.

**EL 447 Digital Subsystems Laboratory (1)**

Laboratory analysis of logic circuits. Synthesis of counters, registers, adders, and other digital subsystems using small and medium scale integrated circuits. 1 laboratory. Prerequisite: EL 319.

**EL 448 Digital Computer Systems Laboratory (1)**

Laboratory analysis and synthesis of digital computer systems and subsystems. Use of small and medium scale integrated circuits and preconstructed digital subsystems. 1 laboratory. Prerequisite: EL 407, EL 447.

**EL 451 Solid State and Microelectronic Laboratory (1)**

Laboratory study of electronic properties of semiconducting materials. Basic exercises in fabrication and evaluation of solid state and microelectronic devices and circuits. 1 laboratory. Prerequisite: EL 421, senior standing or consent of instructor.

**EL 455 Active Network Synthesis Laboratory (1)**

Advanced laboratory study of sensitivity and stability of active networks prescribed for realization of transfer functions by active network synthesis techniques. Formal experiments and individual project work. 1 laboratory. Concurrent or prerequisite: EL 425.

**EL 456 Communication Systems Laboratory (1)**

Methods of analog and digital modulation and demodulation. Effect of the transmission medium on modulation and coding techniques. 1 laboratory. Prerequisite: EL 414.

**EL 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects results are presented in a formal report. Minimum 120 hours total time. Prerequisite: EE 325, EL 309, 319, 334.

**EL 463 Undergraduate Seminar (2)**

Discussion of new developments in the fields of communications, computers, and industrial electronics. Fields of employment and job considerations. Credit/No Credit grading. 2 lectures. Prerequisite: Senior standing.

**EL 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**EL 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**EL 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**EL 515 Digital Filtering (3)**

Z-transform. Frequency domain design of digital filters. Two-dimensional digital filtering with applications to x-ray enhancement, image deblurring, scene analysis, processing of radar and sonar arrays. Fast Fourier transform. Hardware for digital filtering. 3 lectures. Prerequisite: EL 411 or 425.

**EL 517 Information Theory (3)**

An introduction to information transmission theory and coding theory, covering information and entropy, Markov information sources, code properties, coding theorems; Shannon-Fano Codes, linear codes, hamming codes, continuous channels, Gaussian signals and channels. 3 lectures. Prerequisite: Consent of instructor.

**EL 520 Digital Systems Design (3)**

Design of asynchronous sequential machines and pulse mode logic circuits. Selected automata theory topics. Modern digital system design. Analysis of MOS-LSI multiphase logic structures. Comparison of digital subsystems. Microprocessor as a digital subsystem module. 3 lectures. Prerequisite: EL 319, graduate standing, or consent of instructor.

**EL 521 Computer Systems (3)**

Organization of digital systems, primarily the modern general purpose, high speed digital computer; arithmetic units, control units, memories, peripheral equipment. Cost and speed trade-offs in the design of such systems. 3 lectures. Prerequisite: EL 407, Engr 520, or consent of instructor.

**EL 522 Microprocessor-Based Digital System Design (4)**

Design and implementation of microprocessor-based digital systems. Their analysis and cost effective use in system design problems. Data acquisition and control systems. Analysis role of microperipherals. Laboratory problems associated with interfacing microprocessors to various systems. 3 lectures, 1 laboratory. Prerequisite: EL 404, Engr 521 or consent of instructor.

**EL 524 Solid State Electronics (3)**

Physical theory of solid-state devices. Properties of metal-semiconductor junctions and p-n junctions. Derivation of properties of diodes, transistors, and four-layer devices from basic physical and mathematical considerations. 3 lectures. Prerequisite: Phys 412 or equivalent.

**EL 526 Modern Communication Theory (3)**

Introduction to modern communication theory. Representation of random signals, signal detection and selection, estimation of signal parameters and modulation. Optimum receiver principles, application to digital communications and radar systems. 3 lectures. Prerequisite: EL 406, EL 414, and consent of instructor.

**EL 529 Noise in Electron Devices (3)**

Physical sources of electronic noise, noise classification and characterization, noise in vacuum tubes, semi-conductors, p-n junction diode. Schottky barrier diode, bipolar and unipolar transistors, low-noise amplifiers, minimum noise consideration. Noise generation and measurement. 3 lectures. Prerequisite: EL 307 or equivalent.

## **ENGINEERING**

**Engr 102 Orientation (1)**

Familiarization with the scope of engineering science. 1 lecture.



**Engr 111 Introduction to Plant Engineering (2)**

Survey of career opportunities in Plant Engineering. Job entry requirements and employment procedures. Technical and professional preparation. 2 lectures.

**Engr 251 Digital Computer Applications (2)**

Programming techniques and procedures with applications to several selected engineering problems from a variety of course situations. Actual problem solutions by means of a digital computer will be required. 2 activities. Prerequisite: Math 142 or 132, Phys 131 or 121.

**Engr 260 Engineering and Technology Internship (2-4)**

The selected student will spend specified quarters in industry or in a government installation, under educational supervision, working in a field related to the student's major. Total credit limited to 16 units. Prerequisite: Admission to cooperative education program and consent of instructor.

**Engr 301 Technology in the 20th Century (3)**

The role of science, engineering and technology in the twentieth century. Effects of technological change, the function of the scientist-engineer in society. The computer as a tool, case studies of systems to compare alternative approaches to problem solving. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Engr 302 Plastics Design (2)**

Properties of plastics as a class of materials. Interpretation of plastic design data. Principles underlying the properties of plastics. Design problems. Laboratory applications of plastics processes and their effects on design. 1 lecture, 1 laboratory. Prerequisite: Chem 122 or 125 or consent of instructor.

**Engr 311, 312 Mechanical and Electrical Systems (3-3)**

Introduction to design and installation of heating, air conditioning, plumbing, fire protection and electrical systems. Emphasis on structural and architectural implications of system types, lighting and power requirements, code constraints, and first and operating costs. 3 lectures.

**Engr 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**Engr 410 Engineer Examination Review (2)**

Review of engineering fundamentals including mathematics, statics, dynamics, strength of materials, fluid mechanics, electricity, thermodynamics, heat transfer, chemistry, and economics, in preparation for Engineer-in-Training and Professional Engineer examinations. Not acceptable for graduate credit. 2 lectures. Prerequisite: Senior standing in Engineering, Architecture, or Agricultural Engineering.

**Engr 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**Engr 599 Design Project (Thesis) (2) (2) (5)**

Each individual or group will be assigned an industrial project for solution under faculty supervision as a thesis requirement for the Master of Engineering degree. An appropriate experimental or analytical thesis may be accepted.

## ENGINEERING TECHNOLOGY

### ET 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

### ET 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation of techniques, studies or laboratory application of selected problems. Total credit limited to 4 units, with maximum of 2 units per quarter. Prerequisite: Permission of department head.

### ET 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects are typical of problems graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

### ET 463 Undergraduate Seminar (2)

Special studies and technical developments in the field. Individual reports on important technology in the engineering technology field. 2 meetings. Prerequisite: Sp 200 and senior standing.

### ET 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

### ET 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

### ETAC 121 Air Conditioning and Refrigeration Principles (4)

Principles of commercial and industrial air conditioning and refrigeration systems. Installation, service maintenance, and cost estimating. 3 lectures, 1 laboratory. Prerequisite: Phys 121.

### ETAC 122 Environmental Graphics (2)

Principles and practices of mechanical and architectural graphics applied to the development of the spatial concepts essential to the design and installation of environmental systems. 1 lecture, 1 laboratory.

### ETAC 123 Environmental Graphics and System Design (2)

System design and layout of environmental control system. Energy analysis, air distribution, hydronic and solar systems. 1 lecture, 1 laboratory. Prerequisite: ETAC 122.

### ETAC 201 Air Conditioning and Refrigeration Codes (2)

Introduction to current federal, state, and local codes for equipment and human safety as applied to building plumbing, heating, ventilating, refrigeration, and air conditioning systems. 2 lectures.

### ETAC 214 Plumbing and Building Sanitation (4)

Application of materials and equipment in the design of piping for plumbing and drainage, special wastes, water supplies, fuel services, and fire protection in buildings and engineering structures. Selection of piping, connections, and plumbing fixtures as specified by current national and local codes. Specification writing for complete building sanitation systems. 3 lectures, 1 laboratory. Prerequisite: Phys 121.

**ETAC 221 Mechanical Equipment of Buildings (3)**

Application of engineering analysis and building code requirements in the design of building systems for handling water supplies, liquid wastes, fuel, gas and ventilation. Related systems connecting groups of buildings, health and accident hazards involved. 2 lectures, 1 laboratory. Prerequisite: Phys 123.

**ETAC 301 Programmable Calculator for HVAC (3)**

Programming techniques, estimating and design problems peculiar to Heating and Ventilating and Air Conditioning industry. 1 lecture, 2 activities. Prerequisite: Junior standing or permission of instructor.

**ETAC 302 Heat Exchanger Technology (3)**

Heat exchanger applications for the heating, ventilating, air conditioning and refrigeration industries. 2 lectures, 1 laboratory. Prerequisite: Phys 122, Math 133, EnvE 301, ETAC 331.

**ETAC 321 Air Distribution Systems (3)**

Materials and techniques in fabrication and installation of air ducts for heating, ventilating, refrigerating, and air conditioning. Introduction to fabrication of air handling equipment and related accessories for high and low velocity systems. 1 lecture, 2 laboratories. Prerequisite: EnvE 204 or ET 221.

**ETAC 331, 332 Refrigeration Systems (3) (3)**

Operation, installation, and supervision of medium and low temperature refrigeration systems for food and product processing and storage using various staging systems. Cold storage and building requirements for efficient operation. Low temperature testing and cryogenic refrigeration. Transport refrigeration system. 2 lectures, 1 laboratory. Prerequisite: ETAC 121.

**ETAC 425, 426 Air Conditioning Systems (3) (3)**

Application of complete air conditioning consisting of heating, ventilating, humidification, dehumidification, refrigeration, air pollution, water treatment and control equipment for commercial and industrial applications. 2 lectures, 1 laboratory. Prerequisite: ETAC 332.

**ETAC 439 Instruments and Controls (3)**

Application of instrumentation and automatic controls to heating, ventilation and air conditioning systems. 2 lectures, 1 laboratory. Concurrent: ETAC 121.

**ETAC 445 Advanced Control Systems (3)**

Electrical, electronic, and pneumatic systems used to control heating, ventilating and air conditioning installations. 2 lectures, 1 laboratory. Prerequisite: ETAC 439.

**ETEL 124 Introduction to DC Circuits (4)**

Fundamental concepts and laws of DC electrical circuits. Applications of DC instrumentation. 3 lectures, 1 laboratory. Corequisite: Math 120.

**ETEL 125 Introduction to AC Circuits (4)**

Fundamental concepts and laws of AC electrical circuits. Application of AC instrumentation such as the TVM and oscilloscope. 3 lectures, 1 laboratory. Prerequisite: ETEL 124.

**ETEL 126 Electrical Practices (4)**

Fundamentals of industrial power distribution systems. Introduction to theory and practice of polyphase circuits and motors. Electrical safety, industrial wiring practices, and practical trouble shooting. 3 lectures, 1 laboratory. Prerequisite: ETEL 125.

**ETEL 218 Digital Circuits I (3)**

Mathematical and logic foundations of digital systems. Topics include: number systems, Boolean Algebra, logic symbology, implementation of combinational networks, flip-flops, registers. 3 lectures. Prerequisite: Math 120.

**ETEL 232 Electronic Circuits and Devices I (4)**

Semiconductor devices and circuits. H-parameters and load line techniques in analyzing amplifiers. Computation of current, voltage, and power gains input and output impedances. Bias stability and leakage current considerations. 3 lectures, 1 laboratory. Prerequisite: Math 120, ETEL 125 and ETEL 234.

**ETEL 233 Electronic Circuits and Devices II (4)**

Study of active discrete and integrated field effect devices. Use of device parameters and specifications to analyze simple linear circuits. Study and use of pulse and timing circuits, power amplifier circuits, and active regulated DC power supplies. 3 lectures, 1 laboratory. Prerequisite: ETEL 232.

**ETEL 234 Passive Network Analysis (4)**

Basic passive network analysis. Review of DC circuits and application of Thevenin and Norton theorems to steady state AC networks. Use of complex number ( $j$ -operator) in circuit analysis. Development of AC passive circuit transfer functions with gain-phase versus frequency analysis (Bode Plots). Series-parallel equivalent circuits of RLC circuits and transformers. Introduction to RC and RL transients analysis. 3 lectures, 1 laboratory. Prerequisite: ETEL 125, Math 131.

**ETEL 311 Advanced Networks (4)**

Application of constant- $k$ ,  $M$ -derived and  $T$ - $\pi$  LC filters, single and double tuned circuits, circuits, and transmission lines. Smith charts and stub matching. 3 lectures, 1 laboratory. Prerequisite: ETEL 234, Math 132 concurrently.

**ETEL 312 Active Linear Circuits (4)**

Analysis and design of multistage transistor amplifier with emphasis on the operational amplifier and its applications. Low-frequency and high-frequency limitations, Miller effect, pulse testing, Bode Plots, Nyquist stability criteria. Barkhausen criteria for oscillation. Power amplifiers, heat sinks, integrated circuit voltage regulators. 3 lectures, 1 laboratory. Prerequisite: ETEL 233, 234, Math 133.

**ETEL 334 Digital Circuits II (4)**

Analysis of electronic digital circuits. Topics include: Bipolar and MOS logic gates, loading and interfacing, counters, adders, memories, encoders, decoders, digital displays, A/D and D/A converters. 3 lectures, 1 laboratory. Prerequisite: ETEL 233, ETEL 218.

**ETEL 335 Communications I (4)**

Communication signal spectrum investigation includes time domain to frequency domain conversions using Fourier analysis. Evaluation of various modulation techniques including amplitude, angle, and pulse forms is made. A study of noise, its use and effects in communications, and a study of various forms of solid state RF amplifiers is also included. 3 lectures, 1 laboratory. Prerequisite: ETEL 311, 312.

**ETEL 432 Automatic Control (4)**

Electronic and electromechanical systems used in servomechanisms. Stability criteria. Nichols Chart utilization. Compensation networks and control system testing. 3 lectures, 1 laboratory. Prerequisite: ETEL 312.

**ETEL 435 Communications II (4)**

Analysis of the radiation and propagation of the communication signal, and the application of antennas for impedance matching and for providing system gain. Analysis of circuits, including the phase lock loop used in receivers and transmitters and techniques used in measuring their performance. 3 lectures, 1 laboratory. Prerequisite: ETEL 335.

**ETEL 438 Mini-Computer Technology (4)**

Analysis of mini-computer circuits. Organization of circuits into a complete computing system. Special purpose assembly language programming Techniques for location of circuit malfunctions with the aid of computer maintenance manuals and laboratory equipment. 3 lectures, 1 laboratory. Prerequisite: ETEL 334.

**ETEL 441 Video Technology (4)**

Introduction to colorimetry principles. Review of television system synchronization and compatibility requirements. Analysis of the operation of circuits in a solid state television. Circuit responses observed in laboratory. Field trip to a major network television facility. 3 lectures, 1 laboratory. Prerequisite: ETEL 312, 335.

**ETEL 448 Computer Peripheral Maintenance (3)**

Analysis of peripheral device operation for CRT terminals, teletypes, card readers, line printers, tape drives, disc drives and floppy discs. Techniques for location of malfunctions using maintenance manuals and laboratory equipment such as oscilloscopes, logic probes and logic analyzers. 1 lecture, 2 activities. Prerequisite: ETEL 438.

**ETEL 449 Microcomputer Technology (3)**

Analysis of the common LSI components which make up a microcomputer system. Applications of microprocessors in instrumentation, general and special purpose computers, and consumer products. Introduction to programming techniques and use of assemblers, editors, monitors and simulators. 1 lecture, 2 activities. Prerequisite: ETEL 438.

**ETEL 452 Active Filters and Networks (2)**

Active filters using I.C. Operational Amplifiers. Practical circuits for low-pass, high-pass and bandpass filters. Study of design methods and applications. 1 lecture, 1 activity. Prerequisite: ETEL 312.

**ETME 131 Introduction to Engineering Drawing (2)**

Basic instruction in drafting techniques and equipment. Geometric constructions for drafting. Basic principles and practices of isometric, oblique, and multiview drawing systems, including section reviews. 1 lecture, 1 laboratory.

**ETME 141 Applied Descriptive Geometry (2)**

Graphical solutions of problems involving points, lines and planes in three-dimensional space by method of multiview projection. Intersections and development of geometric solids. Application to engineering design. 1 lecture, 1 laboratory. Prerequisite: High school drafting or ETME 131.

**ETME 142 Engineering Drawing Systems (2)**

Advanced multiview and pictorial drawing. Detail and assembly drawings. Conventional industrial drafting practices including section views. Techniques of dimensioning. 1 lecture, 1 laboratory. Prerequisite: High school drafting or ETME 131.

**ETME 156 Electronic Graphics and Standards (2)**

Schematic drafting and representation of electrical and electronic circuits, solid state devices, transducers and machines. Layouts, technical sketching, industrial standards and symbols. 1 lecture, 1 laboratory. Prerequisite: High school drafting or ETME 131.

**ETME 205 Statics (3)**

Statics by scalar methods. Includes forces, couples, resultants, equilibrium, trusses, cables, friction, centroids, and moments of inertia. 3 lectures. Prerequisite: Math 131.

**ETME 206 Dynamics (4)**

Dynamics by scalar methods. Includes kinematics (both absolute and relative motion of particles and bodies) and kinetics, force, mass, acceleration, work and energy, impulse and momentum, and fundamentals of vibrations. 4 lectures. Prerequisite: ETME 205 and Math 132.

**ETME 237 Industrial Hydraulics and Pneumatics (4)**

Basic principles of hydraulics and pneumatics. Characteristics and performance of various hydraulics and pneumatic components such as pumps, compressors, cylinders, motors, valves, accumulators, lines, fittings, filters, etc. Hydraulic fluids. Component selection and circuit layout using U.S. standard graphic symbols. 3 lectures, 1 laboratory. Prerequisite: ETME 311 or consent of instructor.

**ETME 301 Thermodynamics (4)**

Fundamental concepts of work, heat, and energy. First and second laws of thermodynamics. Properties of ideal gases and vapors. Combustion. Vapor and gas power cycles. Introduction to heat transfer fundamentals. 4 lectures. Prerequisite: Math 133, Phys 122, Chem 121.

**ETME 311 Fluid Mechanics (3)**

Study of the principles that underlie the flow of various fluids. Fluid statics, kinematics of fluid flow, viscosity and fluid friction. Incompressible flow in pipes and open channels, flow measurement, fluid machinery and lubrication. 3 lectures. Prerequisite: Phys 122, ETME 206.

**ETME 320 Mechanisms (4)**

Motion of machine parts. Graphical methods for determining displacements, velocities, and accelerations in linkages, cams, gears, and other mechanical assemblies. 2 lectures, 2 two-hour laboratories. Prerequisite: Phys 121, ETME 142, Engr 251.

**ETME 337 Instrumentation of Mechanical Systems (3)**

Principles of process instrumentation and control. Temperature, pressure, flow and level measurement. Analytical instrumentation. Pneumatic and electric transmission devices and controllers. Signal conditioning. Recorders and indicators. 2 lectures, 1 laboratory. Prerequisite: ETEL 125, ETME 311.

**ETME 338 Industrial Engines (3)**

Types of power plants and their application to vehicles and stationary plant generators, compressors, and other industrial equipment. Includes gas, gasoline, diesel and steam engines; gas and steam turbines, boilers and some of the newer developments being applied to industry. Fuel conservation and pollution control. 2 lectures, 1 activity. Prerequisite: ME 136, 146, ETME 237, 301, 337.

**ETME 344 Advanced Design Drawing (2)**

Preparation of detail and assembly drawings from design layouts. Tolerances on lineal dimensions and geometric form. Surface finish symbols, production notes and parts lists. Threads, fasteners and applications of welding symbols. 2 laboratories. Prerequisite: ETME 142.

**ETME 421, 422 Applied Machine Design (4) (4)**

Machine design emphasizing properties of materials relative to structural loading and design; layout of machine elements. Laboratory includes solution of realistic design projects. 2 lectures, 2 activities. Prerequisite: ETME 344, 320, CE 202, 203.

**ETME 437 Applied Fluid Power Systems (4)**

Application aspects of hydraulic and pneumatic equipment. Design, selection and layout of devices and systems including electrical and pneumatic control logic. 2 lectures, 2 laboratories. Prerequisite: ETME 237, 344, 421, Engr 251.

**ETME 443 Mechanical Systems (4)**

Application of technical principles incorporating various components into an integrated system. Project design oriented activities to provide an industrial like condition so that the student may become familiar with component selection and layout of mechanical systems, emphasizing industrial handbook and catalog material. 4 laboratories. Prerequisite: ETME 237, 422, Met 235.

**ETMP 121 Manufacturing Survey (1)**

An overview of manufacturing processes relating to metals and plastics. Includes study of materials, thermal cutting systems, welding, forming, machining, and foundry processes. Open to all majors. 1 lecture.

**ETMP 127 Manufacturing Processes Fundamentals (2)**

Survey of materials and manufacturing processes. Possibilities and limitations of these processes. Application to fabrication of industrial products. Limited experience in conventional machine tool operation and use of semiprecision measuring tools. For nonengineering majors. 1 lecture, 1 laboratory.

**ETMP 144 Manufacturing Processes: Turning-Milling (2)**

Uses, capabilities, theoretical and operational characteristics of lathe and milling type machine tools, including conventional automatic and numerical control. Study of cutting tool characteristics, cutting fluids, quality control, production methods and economics. 1 lecture, 1 laboratory.

**ETMP 145 Manufacturing Processes (2)**

Relationship between engineering design and production fabrication. Hole forming by drilling, broaching, punching, piercing and nontraditional methods including numerical control. Forming and assembling of gage metal components. Machine tool classifications; use of hand tools; basic layout procedures; engineering and economic significance of various production techniques. 1 lecture, 1 laboratory.

**ETMP 224 Advanced Machining Technology (4)**

Theory and operational problems of manual and automatic machine tools. Evaluation of cutting tool geometry, machinability, and tool performance with conventional and exotic materials and processes. 2 lectures, 2 laboratories. Prerequisite: ETMP 144.

**ETMP 240 Additional Engineering Laboratory (1-2)**

Advanced production and toolroom problems. Design and construction of laboratory tooling and instrumentation. Individual and group investigation of selected problems. Total credit limited to 4 units, not more than 2 units per quarter. 1 or 2 laboratories. Prerequisite: Consent of instructor.

**ETMP 244 Electronic Assembly Techniques (2)**

Fabricating electronic and electrical units. Soldering techniques including production methods. Printed circuit techniques, electrical connections, cabling processes and component assembly. Project planning. 1 lecture, 1 laboratory. Prerequisite: ETWT 152.

**ETMP 245 Advanced Machining Operations (2)**

Advanced problems of conventional, automatic and numerical control lathe and milling type machine tools. Application of machine accessories, fixtures and attachments. American Standard Association Charts, data and material classification. Instrumentation for quality control. Metal cutting band, saw gear shaper, and hobber. 1 lecture, 1 laboratory. Prerequisite: ETMP 224.

**ETMP 321, 322, 323 Tool Design (3) (3) (3)**

Design of manufacturing tools such as jigs, fixtures, and dies. Material selection, tolerance balancing, and quality control requirements as economic design factors. Field trips to manufacturing centers. 2 lectures, 1 laboratory. Prerequisite: ETMP 224, ETME 344 or consent of instructor.

**ETMP 324 Machine and Production Analysis (2)**

The integrated manufacturing process. Adapting methods of fabrication based on machine and process availability, production control, and cost estimates. 1 lecture, 1 activity. Prerequisite: IE 201, 214, ETMP 144, ETWT 259.

**ETMP 325 Abrasive Machining and Finishing (2)**

Properties of abrasives for cutting tool application. Selection, care, and preparation of bonded abrasives used on machine tools. Fundamentals of machine grinding, emphasizing productivity, attainment of surface finish, accuracy, and repeatability. Role of grinding fluids. Grinding capability and comparison to other processes. 1 lecture, 1 laboratory. Prerequisite: ETMP 224, 245.

**ETMP 336 Numerical Control Machine Tool Programming (3)**

In-depth study of numerical control machine tool programming including: linear and circular interpolation. G M S and T functions. 2 and 3 axis contouring. Principles and concepts of N/C fixtures, tooling and set-up practices. 2 lectures, 1 laboratory. Prerequisites: ETMP 144; MfgE 233.

**ETMP 421 Industrial Numerical Control (3)**

Computer aided numerical control programming using APT, UNIAPT, Compact II and other programming languages. Tool motion optimization studies, developing subroutines, repetitious part programming and adaptive control. 2 lectures, 1 laboratory. Prerequisite: ETMP 336 or consent of instructor.

**ETMP 434, 435, 436 Tool and Manufacturing Engineering (3) (3) (3)**

Construction and testing of jigs, fixtures, dies, and special tools for production. Design, engineering, and economical application of conventional and specialized machine tools. Field trips to manufacturing centers. 1 lecture, 2 laboratories. Prerequisite: ETMP 323.

**ETWT 144 Manufacturing Processes (2)**

Theory and application of metal cutting and welding processes. Includes shielded metal arc, flux cored arc, submerged arc, gas metal arc, gas tungsten arc, brazing, electron beam, resistance, and oxy-acetylene processes. Bonding theory, joint design, codes and testing. 1 lecture, 1 laboratory.

**ETWT 152 Micro Bonding (2)**

Theory, practice, and applications of joining processes associated with electronic circuitry including soldering, thermocompression, ultrasonic and beam lead bonding, plasma needle arc, and electron beam welding. 1 lecture, 1 laboratory.

**ETWT 155 Industrial Welding Technology (1)**

Application of various electric welding processes to joining of steel sheet and plate. Includes short circuiting arc, flux cored electrode, gas metal arc, and shielded metal arc processes. Gas welding of steel pipe and hard surfacing. 1 laboratory. Prerequisite: ETWT 144.

**ETWT 156 Welder Qualification Technology (1)**

Out of position fillet and groove welds in carbon steel plate. Welder qualification tests according to code requirements. 1 laboratory. Prerequisite: ETWT 144.

**ETWT 235 Nondestructive Examination (4)**

Theory and application of nondestructive test systems for quality control. Includes radiography, ultrasonic, magnetic particle, penetrants, eddy current and holography. For Engineering Technology, Welding, and Manufacturing Processes majors. 2 lectures, 2 laboratories. Prerequisite: ETWT 259, Phys 123.

**ETWT 240 Additional Welding Laboratory (1-2)**

Individual welding investigation of current methods and applications. Studies of laboratory procedures and selected problems. Total credit limited to 4 units, not more than 2 units per quarter. 1 or 2 laboratories. Prerequisite: ETWT 144 or consent of instructor.

**ETWT 259 Advanced Welding (1)**

Theory and application of various gas shielded arc welding processes to the welding of aluminum, carbon steel, and stainless steel. 1 laboratory. Prerequisite: ETWT 144.

**ETWT 324 Welding Technology (4)**

Structure of metals, types of steel and their manufacture. Welding processes, shielding flux, slags and gasses, effects of alloying elements. Metallurgy of carbon steel welds, metallography techniques. 2 lectures, 2 laboratories. Prerequisite: Met 235 and junior standing.



#### **ETWT 325 Welding Technology (4)**

Mechanical properties of metals, mechanical testing. Shrinkage and distortion in weldments, current preheating and postheating practices. Weldment defects, filler materials. Welding metallurgy of carbon and low alloy high strength steels. 2 lectures, 2 laboratories. Prerequisite: ETWT 324, ETMP 144.

#### **ETWT 326 Welding Technology (4)**

Weldability studies of alloy steels, AWS structural code welding procedure qualification of carbon and alloy steels. Metallographic and mechanical property tests. 2 lectures, 2 laboratories. Prerequisite: ETWT 235, 259, 325.

#### **ETWT 336 Welding Power Sources (3)**

Design, selection, and application of welding power sources. Physics of the welding arc as related to power sources. 2 lectures, 1 laboratory. Prerequisite: Phys 123, Math 120, ETEL 126.

#### **ETWT 434 Advanced Welding Technology (3)**

Procedure and performance qualification according to ASME Pressure Vessel Code. Weldability studies of aluminum and its alloys. Cost estimating and cost reduction methods. Basic pressure vessel design. 1 lecture, 2 laboratories. Prerequisite: CE 202, 203; ETWT 235, 326; Phys 123.

#### **ETWT 435 Advanced Welding Technology (3)**

Weldability studies on stainless steels and copper base alloys. Design of complex weldments. Introduction to corrosion. Cost estimating. Emphasis is on semiautomatic and automatic welding processes. 1 lecture, 2 laboratories. Prerequisite: Chem 121, ETWT 434.

#### **ETWT 436 Advanced Welding Technology (3)**

Welding tests, brazing qualifications, weldability of dissimilar metals, quench and tempered steels, welding chambers, electron beam welding. Lab emphasis on field welding and fitting. 1 lecture, 2 laboratories. Prerequisite: ETWT 435.

## **ENGLISH**

#### **Engl 100 Fundamentals of Writing: Spelling and Vocabulary (2)**

Practice in grouping words according to similar spelling patterns, and in remembering those with low predictability. Vocabulary expanded through studying structured writing assignments. Concurrent enrollment in Writing Workshop required (Engl 103). Repeatable. 2 lectures.

#### **Engl 101 Fundamentals of Writing: Sentence Construction (2)**

Practice in writing sentences which express meaning clearly and correctly. Instruction and drill in using words precisely, in removing ambiguity, in using conjunctions as logical connectors, and in following such conventions of Standard Written English as clear pronoun reference and appropriate sequence of tenses. Concurrent enrollment in Writing Workshop required (Engl 103). Repeatable. 2 lectures.

#### **Engl 102 Fundamentals of Writing: Logic and Organization (2)**

Practice in recognizing relationships between ideas, and in understanding the aim and organization of paragraphs. Instruction and practice in focusing paragraphs, ordering ideas logically, and supporting them convincingly. Concurrent enrollment in Writing Workshop required (Engl 103). Repeatable. 2 lectures.

#### **Engl 103 Writing Workshop (1)**

Required of all students enrolled in Engl 100, 101, and 102. Individualized tutorial help for students completing writing projects which utilize skills being studied in fundamental courses. Repeatable. 1 lecture.

#### **Engl 104 Freshman Composition (3)**

Practical study and application of techniques of exposition. Critical reading of model essays. Frequent writing assignments. 3 lectures.

**Engl 105 Freshman Composition (3)**

Practical study and application of persuasion and argument. Introduction to library research. Less frequent but more intensive writing assignments culminating in an original research paper. Readings for critical analysis. 3 lectures. Prerequisite: Engl 104.

**Engl 106 Intensive Composition (4)**

Instruction in generating sentences that express meaning clearly and correctly. Practice aimed specifically at mastering inflections, the tense system, and basic sentence patterns. Frequent short writing assignments. Prepares students for English 107. Repeatable. 4 lectures.

**Engl 107 Intensive Composition (4)**

Continued instruction in basic mechanics, with increased attention to sustaining and developing thought in longer units of discourse. Analysis of readings to familiarize students with formal discourse. Prepares students for Engl 114. Repeatable. 4 lectures.

**Engl 110 Intensive English (4)**

For the nonnative speaker of standard English who needs additional work with English as a foreign language. Practice in pronunciation, sentence structure, reading, and composition. Individual work in the language laboratory. 4 two-hour laboratories.

**Engl 114 English Composition (4)**

Practical study and application of techniques of exposition. Critical reading of model essays. Frequent writing assignments. Not open to students with credit in Engl 104. 4 lectures.

**Engl 115 English Composition (4)**

Practical study and application of persuasion and argument. Introduction to library research. Less frequent but more intensive writing assignments culminating in an original research paper. Readings for critical analysis. 4 lectures. Prerequisite: Engl 114. Not open to students with credit in Engl 105.

**Engl 204 Introduction to Genres (4)**

Understanding the elements of fiction, drama, and poetry through guided discussion of significant examples of each of the major genre forms. Credit not allowed for both Engl 204 and Engl 207. 4 lectures. Prerequisite: One composition course.

**Engl 207 Introduction to Literature (3)**

Introduction to major forms of literature. Study in depth of selected works with reading for appreciation. May not be elected by English majors. Credit not allowed for both Engl 204 and 207. 3 lectures. Prerequisite: Engl 104 or 114.

**Engl 218 Report Writing (3)**

Forms of communication used in science and industry. Letters, reports, proposals, and articles. Extensive writing practice. 3 lectures. Prerequisite: One composition course.

**Engl 219 Technical Writing (3)**

Content, style, design, and production of communications such as data sheets, manuals, brochures, news releases, and advertisements. Extensive writing and editing. 3 lectures. Prerequisite: One composition course.

**Engl 233 Introduction to Shakespeare (3)**

Selected readings in Shakespeare. Course is designed for General Education. 3 lectures. Prerequisite: Engl 104 or 114.

**Engl 240 Introduction to American Literature (3)**

Literary perspectives on the American experience through selected readings from representative American authors. May not be elected by English majors. Not open for credit to students with credit in Engl 340, 341 or 342. 3 lectures. Prerequisite: Engl 104 or 114.

**Engl 251, 252, 253 Great Books of the Western World (3) (3) (3)**

Selected readings in European literature from the Greeks and Romans to the present, exclusive of the British. Course designed for General Education. 3 lectures. Prerequisite: Engl 104 or 114.

**Engl 254 Twentieth Century Literature (3)**

Readings in the literature of the modern period; significant writers and their literary achievements; relationships to prevailing twentieth century modes of thought. Open to majors and nonmajors. 3 lectures. Prerequisite: Engl 204 or 207 or 240. Repeatable to 9 units under different sub-titles.

**Engl 255 The Bible as Literature (3)**

The Old and New Testaments with historical background. Literary forms and characteristics of Hebraic writing. Appreciation of the far-reaching use of Biblical narrative and reference in literature, speeches, art, drama, and modern film. 3 lectures.

**Engl 260 Children's Literature (3)**

Analysis and evaluation of realism, traditional fantasy, modern fantasy, and poetry for children in multiple subject classroom grades K-8. 3 lectures. Prerequisite: Engl 114.

**Engl 270 Introduction to Cinema (4)**

Stylistic and historical developments. The film art studied through readings, lectures, viewing, and appraisal of landmarks of international cinema. 3 lectures, 1 activity. Prerequisite: One sophomore literature course.

**Engl 271 Film Styles and Traditions (4)**

A close examination of a single cinematic style or tradition (neo-realism, western) with emphasis on how major film makers modify and manipulate artistic conventions. 3 lectures, 1 activity. Prerequisite: One literature course.

**Engl 280 Afro-American Literature (4)**

Selected readings in Afro-American literature. 4 lectures. Prerequisite: Engl 114.

**Engl 281 Mexican-American Literature (4)**

Selected readings in Mexican-American literature in translation. 4 lectures. Prerequisite: Engl 114.

**Engl 290 Introduction to Linguistics (4)**

Overview of linguistics from its origin to present forms and practices. 4 lectures. Prerequisite: Engl 104 or 114.

**Engl 300 Advanced Composition (3)**

Application of grammatical and rhetorical principles to writing. Production of clear, well-planned, effective prose. 3 lectures.

**Engl 301 Modern English Grammar (4)**

Linguistic analysis of the English language. Phonology, morphology, and syntax. Traditional, descriptive-structural, and transformational-generative grammars. 4 lectures. Prerequisite: One composition course.

**Engl 304 Advanced Composition—Nonfiction (4)**

Instruction and practice in writing, revising, and evaluating various forms of nonfiction. 4 lectures. Prerequisite: One composition course.

**Engl 310 Corporate Communication (3)**

Instruction and practice in forms of communication characteristic of business and industry. 3 lectures. Prerequisite: Engl 104 or 114.

**Engl 318 Writing for Scientific Journals (4)**

Practice of the skills necessary in the preparation of articles for scientific journals. Extensive writing and copy-editing, and study of the forms and styles required by the professional societies in each field. 4 lectures. Prerequisite: Engl 115.

**Engl 325 Creative Writing (4)**

Instruction and practice in the writing, revising, and evaluating of fiction, poetry, or drama. 4 lectures. Prerequisite: Engl 115. Repeatable to 8 units.

**Engl 326 Literary Criticism (4)**

Instruction and practice in writing, revising, and evaluating various kinds of critical writing. 4 lectures. Prerequisite: Engl 114.

**Engl 330 British Literature: Medieval Period (4)**

Study of major prose, poetry, and drama of the Old and Middle English periods in modern translations, including Beowulf and Chaucer. 4 lectures.

**Engl 331 British Literature: The Renaissance (4)**

Study of major Elizabethan and Jacobean prose, poetry, and drama, including Jonson, Donne, and Milton. 4 lectures.

**Engl 332 British Literature: The Restoration and 18th Century (4)**

Study of major prose, poetry, and drama of the Restoration and Eighteenth Century, including Dryden, Swift, and Pope. 4 lectures.

**Engl 333 British Literature: The Romantic Movement (4)**

Study of the major prose, poetry, and drama of the Romantic period, including Wordsworth, Coleridge, Byron, Shelley, and Keats. 4 lectures.

**Engl 334 British Literature: The Victorians (4)**

Study of the major prose, poetry, and drama of the Victorian age, including Tennyson, Browning, and Arnold. 4 lectures.

**Engl 340 American Literature to 1860 (4)**

Study of selected major prose and poetry of American literature to 1860. 4 lectures.

**Engl 341 American Literature 1860–1914 (4)**

Study of selected major prose and poetry of American literature 1860–1914. 4 lectures.

**Engl 342 American Literature 1914 to the Present (4)**

Study of selected major prose, poetry, drama of American literature 1914 to the present. 4 lectures.

**Engl 350 Modern Novel (4)**

Readings in representative 20th century novels with special emphasis on origins, form, style, and ideas. 4 lectures. Prerequisite: Engl 204.

**Engl 351 Modern Poetry (4)**

Study of poetry as an art expression of the 20th century. 4 lectures. Prerequisite: Engl 204.

**Engl 352 Modern Drama (4)**

A survey of British and American Drama of the 20th century. 4 lectures. Prerequisite: Engl 204.

**Engl 360 Literature for Adolescents (4)**

A survey of readings in literature suitable for use in secondary schools. 4 lectures. Prerequisite: Engl 104 or 114.

**Engl 390 Modern English Grammar (4)**

Linguistic analysis of the English language. Phonology, morphology, and syntax. Traditional, descriptive-structural, and transformational-generative grammars. 4 lectures. Prerequisite: One composition course.

**Engl 392 Contemporary Grammar and Composition (4)**

English grammar and composition in elementary school programs. Vocabulary, word order, sentence structure, idea development, standards for spelling, punctuation, and composition form. 4 lectures. Prerequisite: Engl 115 or equivalent.

**Engl 395 History of the English Language (4)**

A study of the development of the English language from its origins to its present forms and practices. 4 lectures. Prerequisite: Engl 115.

**Engl 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

**Engl 421 Writing in Secondary Schools (4)**

Approaches to writing in secondary schools. Overview of composition theory and examination of current research on the teaching of writing. Exploration of classroom techniques appropriate to student needs and program goals. 4 lectures. Prerequisite: Engl 115 and Sp 317, or Sp 318.

**Engl 424 Organizing and Teaching English (4)**

Introduction to the organization, selection, presentation, application, and interpretation of subject matter in English in secondary schools. 4 lectures. Prerequisite: Admission to teacher education program or valid teaching credential.

**Engl 430 Chaucer (4)**

Selected readings from *Canterbury Tales* and Chaucer's other major poems. 4 lectures. Prerequisite: Engl 330, or 331, or 332, or 333, or 334.

**Engl 431 Shakespeare (4)**

A study of representative comedies, tragedies, and histories. 4 lectures. Prerequisite: Engl 330, or 331, or 332, or 333, or 334.

**Engl 432 Milton (4)**

A study of *Comus*, *Lycidas*, *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*, with some attention to the minor poems. 4 lectures. Prerequisite: Engl 330, or 331, or 332, or 333, or 334.

**Engl 439 Significant British Writers (4)**

Study in depth of selected British writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 8 units. 4 lectures. Prerequisite: Engl 330, or 331, or 332, or 333, or 334.

**Engl 449 Significant American Writers (4)**

Study in depth of selected American writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 8 units. 4 lectures. Prerequisite: Engl 340, or 341, or 342.

**Engl 459 Significant World Writers (4)**

Study of selected world writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 8 units. 4 lectures. Prerequisite: 8 units of literature or consent of instructor.

**Engl 461 Senior Project (2)**

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Prerequisite: Prior consent of instructor.

**Engl 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Engl 495 Applied Language Study (4)**

Linguistic theory applied to human communications, human relations, and literature. 4 lectures. Prerequisite: Engl 390 or 391 or consent of instructor.

**Engl 502 Introduction to Critical Analysis (3)**

Basic approaches used by critics. Multiple points of view; application to literary works; reflection of critical analysis in student compositions. Designed to aid the teacher of secondary English to enrich the courses taught in secondary schools. 3 lectures. Prerequisite: graduate standing.

**Engl 503 Contemporary Language Study (3)**

Correlation between current development of English language and courses in grammar and composition in public schools. Usage, vocabulary, spelling, idiom, punctuation, grammar, sentence structure. Understanding of effects of language change upon writing and speaking. Suitable for upper grade, junior and senior high school teachers. 3 lectures. Prerequisite: Engl 301 or consent of instructor.

**Engl 504 Problems in Language (3)**

Study of development of English; consideration of problems of grammar and uses of language. May be repeated to 9 units. 3 lectures. Prerequisite: Engl 503.

**Engl 505 Problems in Composition (3)**

Study of special problems in composition. Direct application of new language information to composition or detailed analysis of relationship between rhetorical principles and writing. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate status in English.

**Engl 511 Problems in American Literature (3)**

Concentrated study of American authors or periods. Written and oral reports of individual investigation. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate status in English.

**Engl 512 Problems in British Literature (3)**

Concentrated study of British authors or periods. Written and oral reports of individual investigation. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate standing in English.

**Engl 522 Introduction to Teaching English as a Second Language (3)**

Contrastive analysis of native and target language, methods and materials for testing and teaching English to non-native speakers: phonemic analysis, oral-aural drill, pattern practice, structure and grammar, composition, planning of curriculum materials from available resources. 3 lectures.

**Engl 590 Graduate Seminar in English (1-3)**

Independent or group study of special problems in selected areas of language, composition, or literature. Total credit limited to 3 units. 1-3 lectures. Prerequisite: Graduate status in English.

## **ENTOMOLOGY**

**Ent 220 Agricultural Entomology (4)**

Major insect orders and families of agricultural importance. Taxonomy, identification, life cycles, and histories and controls of insects. 2 lectures, 2 laboratories.

**Ent 326 General Entomology (4)**

Introduction to the study of insects. Structure, major orders and families of insects, life histories, economic importance and control. Insect collection required. 3 lectures, 1 laboratory.

### Ent 332 Economic Entomology (3)

Identification, life histories and control of insects beneficial or injurious to various crops, fruits, stored products, domestic animals and man; important invertebrates such as mites, ticks and spiders. 1 lecture, 2 laboratories. Prerequisite: Zoo 132 or Bot 122; Ent 326; Chem 226 or consent of instructor.

### Ent 421 Immature Stages of Insects (4)

Identification, biology, and economic importance of preimaginal insect forms. 2 lectures, 2 laboratories. Prerequisite: Ent 326, Bio 325.

## ENVIRONMENTAL DESIGN

### EDes 101 Introduction to Architecture and Environmental Design (2)

Familiarization with the professional fields of architecture, landscape architecture, structural engineering, construction, and city planning. Introduction to the school's programs as they relate to individual aptitudes. The design process. Visiting speakers. Credit/No Credit grading. 2 lectures.

### EDes 110 Descriptive Drawing (1)

Exercises in drawing without mechanical aids. Total credit limited to 3 units, not more than 1 unit in any one quarter. 1 laboratory.

### EDes 111 Introduction to Drawing and Perspective (3)

Basic techniques used in graphic communication. Orthographic and isometric projection. Mechanical perspective, shades and shadows. 3 laboratories.

### EDes 112 Basic Graphics (3)

Drawing as a communication tool in the Environmental Design fields. Exercises to develop basic skills and speed in the representation of ideas. Use of various drawing media. 3 laboratories. Prerequisite: EDes 111.

### EDes 113 Graphics (6)

Covers material in EDes 111 and 112. Primarily for transfer students. Partial credit may be granted. 6 laboratories.

### EDes 201, 202, 203 Environmental Design Fundamentals (3) (3) (3)

Elements of visual perception. Theories of environmental design. Program development. Analytic techniques and problem solving methodologies. Behavioral and social implications of environmental design decisions. Projects in the environmental context. Field trip required. 3 laboratories. Prerequisite: EDes 101, 112.

### EDes 204 Societal Factors in Environmental Design (3)

Social and cultural factors in environmental design. Physical settings, cultural sentiments and societal factors which influence environmental form. 3 lectures.

### EDes 210 Advanced Descriptive Drawing (2)

Advanced programs in descriptive drawing as continuation of EDes 110. 2 laboratories.

### EDes 213 Principles of Site Analysis (3)

Introduction and application of selected inventory and analysis techniques through literature survey and exercises at several scales. Limited sites to regional. 3 lectures. Prerequisite: Engl 104.

### EDes 221 Introduction to Environmental Design Science (3)

Introduction to environmental sciences and their impact on man's physical structures. Influence of light, sound, thermal conditions and solar energy on buildings and community design. Energy conservation design factors. 3 lectures. Prerequisite: Phys 131, 132.

### EDes 250 Digital Computer Applications (2)

Introduction to the application of batch-processing, time-sharing and computer graphics in environmental design. 1 lecture, 1 laboratory.

**EDes 301 Environmental Impact Reporting (3)**

Systematic and interdisciplinary methodologies for information handling and transfer for decision making in environmental development. Public concerns, participation and legal implications. Problem areas. 3 lectures. Prerequisite: Third-year standing.

**EDes 303 Human Factors for Environmental Designers (3)**

Integrated approach to development of systematic design programs. Developing and interpreting human factors design criteria, performance and satisfaction as a function of environmental factors, determining and assessing user preferences, methods of field observation and analysis. 3 lectures. Prerequisite: Psy 202 and second year standing in School of Architecture and Environmental Design or permission of instructor.

**EDes 304 Human Factors for Environmental Designers (3)**

Development of human factors based on urban design criteria. Identifying and interpreting client/user needs, expectations and requirements. Application of interview, questionnaire and survey methods to environmental, sociocultural and adaptive processes. 3 lectures. Prerequisite: EDes 303 or permission of instructor.

**EDes 319 Human Performance in the Built Environment (3)**

Assessment and measurement of the relationships between design, methods of construction, cost and manpower utilization. Design and construction of structures for minimum cost consistent with intended function. Materials selection and construction processes related to minimum man-hours and nonspecialized labor skills. 3 lectures. Prerequisite: Third-year standing in the School of Architecture and Environmental Design.

**EDes 463 Undergraduate Seminar (2)**

Discussion and lectures on problems of practice in the environmental design field. Professional ethics. Students present organized material on some subject of interest in Architecture, Architectural Engineering, Construction, City and Regional Planning or Landscape Architecture. 2 meetings. Prerequisite: Senior standing in degree major.

## **ENVIRONMENTAL ENGINEERING**

**EnvE 101 Environmental Engineering Systems (2)**

Analysis and design of elementary systems related to environmental control. Topics in thermal environmental control, air and water pollution control, and solid waste management. 1 lecture, 1 laboratory.

**EnvE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**EnvE 202, 203 Heating and Ventilating (3) (2)**

Analysis of heating and ventilating processes and equipment; application to industrial, commercial and public buildings. 3 lectures (202), 2 lectures (203). Prerequisite: Chem 121 or 124 and Phys 122 or 132.

**EnvE 221 Solar Energy (3)**

Methods of utilizing solar energy. Energy concepts. Collection and storage systems; greenhouse effect. Commercial and residential building applications. Solar power generation; measurements; recent technical developments and literature. 3 lectures. Prerequisite: Phys 121, 122, 123 or equivalent.

**EnvE 231 Fluid Systems (2)**

Materials, equipment, principles, and techniques used in designing and installing environmental fluid flow systems. Uniform Plumbing Code. Field trips to relevant installations. 1 lecture, 1 laboratory. Prerequisite or concurrent: Phys 122 or 132, Chem 121 or 124.



**EnvE 240 Additional Engineering Laboratory (1–2)**

Elective project work. Total credit limited to 4 units with not more than 2 units in any quarter. 1 or 2 laboratories.

**EnvE 251 Environmental Engineering Measurements (2)**

Experimental studies of the instrumentation and basic measurements of concern to the environmental engineer. Procedures used in the analysis and reporting of experimental data. Corollary concepts of basic physical phenomena. 1 lecture, 1 laboratory. Prerequisite: EnvE 202.

**EnvE 301 Introduction to Heat Transfer (3)**

Principles of conduction, convection, and radiation heat transfer. Steady-state conduction, forced and natural convection, radiation, boilers, and heat exchangers. 3 lectures. Prerequisite: Math 133, Phys 123, ETME 301.

**EnvE 304 Thermodynamics of Processes (3)**

Material balances, energy balances, liquids and mixtures, vapor-liquid equilibria, solubility and absorption, equilibrium in chemical reactions. 3 lectures. Prerequisite: ME 302; Chem 126 or permission of instructor.

**EnvE 305 Thermodynamics of Refrigeration (4)**

Thermodynamic analysis of refrigeration cycles. Thermodynamic analysis of various vapor compression refrigeration systems and components. 4 lectures. Prerequisite: ME 302, Chem 125.

**EnvE 309 Noise and Vibration Control (3)**

Behavior of sound waves, selection of instrumentation, practical measurements, criteria for noise and vibration control. 3 lectures. Prerequisite: Phys 133, Math 241.

**EnvE 310 Weather and Climate (3)**

Weather and climate as a part of the environment. Impact of these factors on industry, commerce and agriculture. Public services. Observation instruments and techniques. Not open to students who have credit for EnvE 428. 3 lectures. Prerequisite: Chem 106, Math 103, Phys 104 and junior standing.

**EnvE 313 Heat Transfer (3)**

Basic principles of heat transfer. Radiation, conduction, and convection in gasses and liquids during forced and gravity flow conditions, behavior of heat exchangers. 3 lectures. Prerequisite: ME 302 or Chem 305, Math 242.

**EnvE 316 Automatic Process Control (2)**

Introduction to automatic control instrumentation. Methods of analysis of control systems. Analytical determination of control response. 2 lectures. Prerequisite: Math 242, ME 302, EnvE 313.

**EnvE 322 Solar Energy Engineering (3)**

Radiation measurement and estimation at earth's surface. Radiation properties of opaque and transparent materials. Flat plate and focusing collectors. Energy storage. Heating and cooling of buildings. Solar power and distillation. 3 lectures. Prerequisite: EnvE 221, 313, ME 302 or Chem 305, ME 341.

**EnvE 324 Introduction to Air Pollution (3)**

Causes and effects of air pollution on the individual, the community and industry. Legal and economic aspects. For non-majors. 3 lectures. Prerequisite: Junior standing.

**EnvE 325 Environmental Air Quality (3)**

Consideration of ambient air contamination inside and outside. Factors included in establishing, monitoring and maintaining air quality standards. 3 lectures. Prerequisite: Chem 125. Concurrent: ME 302.

**EnvE 326 Air Pollution Measurements (3)**

Planning and conduct of atmospheric surveys. Collection, evaluation, and interpretation of data as they pertain to the concentration of pollutants sampled. 2 lectures, 1 laboratory. Prerequisite: Chem 126, EnvE 325.

**EnvE 330 Environmental Quality Control (3)**

Application of scientific and engineering principles to control the development and use of air, water and land resources. Control of the pollution of the environment. Disposal of wastes. Administrative and legal aspects. 3 lectures. Prerequisite: Junior standing.

**EnvE 352, 353 Thermal and Fluids Laboratory (3) (3)**

Laboratory tests in controls, thermodynamics, fluid flow, heat transfer, noise, and vibration. Analog methods. Performance testing of refrigeration systems, evaporators, condensers, fans, air washers, and air distribution devices. 1 lecture, 2 laboratories. Prerequisite: EnvE 251.

**EnvE 361 System Design (3)**

Project work in designing environmental control systems. Heating, ventilating, air conditioning and air cleaning. Energy conservation analysis of systems and utilization of solar energy. 3 laboratories. Prerequisite: EnvE 203, 322, ME 302.

**EnvE 365 Environmental Management & Urban Systems (2)**

Interdisciplinary study of urban pollution sources and control. Political, economic, and technological interrelationships. Participation in METRO-APEX, assuming roles of several urban decision makers. 1 lecture, 1 activity. Prerequisite: Junior standing.

**EnvE 366 Solar Energy Systems Analysis (5)**

Performance analysis of active and passive systems utilizing solar energy for building and industrial process heating and cooling. Air and liquid systems, sensible and chemical storage, transient analysis, use of computer, absorption and natural cooling, economics, load calculations, controls. 5 lectures. Prerequisite: EnvE 322.

**EnvE 367 Solar Energy Systems Design (3)**

Project work in designing active and passive thermal environmental control and industrial process heating and cooling systems. Selected system designs involving case and feasibility studies, component selection, economic and performance analysis, and design drawings. 1 lecture, 2 laboratories. Prerequisite: EnvE 366.

**EnvE 368 Solar Energy Laboratory (3)**

Experimental studies of the performance of collectors, storage units, space heating and cooling devices, and the integrated systems using these devices. Instrumentation used to measure flow, temperature, insolation, and infrared radiation. Active and passive systems and components will be studied. 2 lectures, 1 laboratory. Prerequisite: EnvE 322.

**EnvE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**EnvE 403 Advanced Mass and Energy Transfer (3)**

Psychrometric properties, processes and measurements. Wetted surface heat and mass transfer. Solar and convective periodic loads. 3 lectures. Prerequisite: EnvE 313, ME 341.

**EnvE 406 Advanced Fluid Flow (3)**

Fluid dynamics and fluid machinery. Centrifugal and axial fans, pumps and compressors. Turbines. Fluid flow in ducts. 3 lectures. Prerequisite: ME 341, EnvE 251.

**EnvE 411 Air Pollution Control (3)**

Theory, principles and practices related to the control of particulate emissions. Mechanical separations. Cost and design of control systems. 3 lectures. Prerequisite: EnvE 326.

**EnvE 421 Mass Transfer Operations (3)**

Theory, principles and practices related to the control of gaseous emissions. Process characteristics. Odor control. Mass transfer operations as applied to environmental control. 3 lectures. Prerequisite: EnvE 325.

**EnvE 422 Environmental Radiation Surveillance (2)**

Sources of radioactive contaminants, biological effects, radiation protection. Environmental sampling and analysis of airborne radiation. Controls and disposal of wastes. 2 lectures. Prerequisite: EnvE 325, Phys 133.

**EnvE 428 Meteorology (3)**

Weather instruments; insolation convection and advection; land and sea breezes; fog, smogs, clouds, and showers; thunderstorms; lapse rate and temperature inversions; cyclones; anti-cyclones; tornadoes and waterspouts; stacks and plumes; meteorological conditions under which air pollution accumulates. 2 lectures, 1 laboratory. Prerequisite: Phys 122 or 132.

**EnvE 434 Water Quality Measurements (2)**

Methods employed in the qualitative and quantitative determinations of water and waste water constituents. Physical, chemical and biological procedures used in determining water quality. Testing of effluents from industrial and municipal treatment plants. 1 lecture, 1 laboratory. Prerequisite: Chem 226, 331.

**EnvE 435 Water and Waste Water Treatment (4)**

Unit operations and unit processes encountered in potable water and waste water treatment. Principles of physical operations; screening, mixing and agitation, sedimentation, filtration, heat and mass transfer. Chemical and biological processes used in potable water and waste water treatment. 4 lectures. Prerequisite: Chem 306, EnvE 434

**EnvE 438 Water and Waste Water Treatment (3)**

Application of the physical operation, and chemical and biological unit processes principles to the analysis and design of potable water and waste water treatment facilities. Advanced waste water treatment technology. Water and waste water sludge treatment. 3 lectures. Prerequisite: EnvE 435.

**EnvE 439 Solid Waste Management (2)**

Chemical and physical properties of municipal and industrial refuse. Landfill disposal, incineration, composting. Industrial and commercial solid waste disposal problems and treatment methods. Pyrolysis. Salvage and recycle operations. Economics of disposal methods. Interrelationship between water quality and landfill operations. 2 lectures. Prerequisite: EnvE 435.

**EnvE 441, 442 Advanced System Design (3) (3)**

Individual and team project work in designing systems for industrial ventilation, air and water pollution control, solid waste disposal and heating, ventilating and air conditioning. 1 lecture, 2 laboratories. Prerequisite: EnvE 203, 313, ME 341.

**EnvE 443 Advanced System Design (3)**

Individual and team project work in designing air conditioning and refrigeration systems. 1 lecture, 2 laboratories. Prerequisite: EnvE 441.

**EnvE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

**EnvE 463 Undergraduate Seminar (2)**

Special studies and technical developments in the field. Individual reports on important research in the environmental engineering field. 2 lectures.

#### **EnvE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

#### **EnvE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

#### **EnvE 532 Industrial Ventilation and Exhaust Systems (3)**

Environmental contamination, dispersion mechanisms, industrial comfort criteria; control of temperature, humidity, cleanliness and motion of air. Natural and forced ventilation, control velocities, air-handling systems and components. 3 lectures. Prerequisite: Graduate standing and consent of instructor.

#### **EnvE 533 Aerosol Technology (3)**

Definition, theory and measurement of particle properties, particle statistics, size distribution, particle transport, gas cleaning, sampling of airborne contaminants. 3 lectures. Prerequisite: Graduate standing and consent of instructor.

#### **EnvE 534 Advanced Design of Pollution Control Systems (3)**

Comprehensive problems in pollution control. Methods of analysis, design of unit operations and processes for environmental engineering facilities. 3 lectures. Prerequisite: Graduate standing and EnvE 325.

#### **EnvE 535 Advanced Wastewater Treatment (3)**

Operations and processes used in tertiary treatment. Chemical coagulation, flocculation, sedimentation, filtration, absorption. Methods for removal of phosphorous, nitrogen, solids and organics. Integration of advanced wastewater treatment processes. 3 lectures. Prerequisite: Graduate standing and consent of instructor.

### **ETHNIC STUDIES**

#### **Eth S 105 Introduction to Ethnic Studies (1)**

Introduction to the contributions of academic disciplines to the study of ethnic groups. The role of ethnic studies in establishing communication and mutual understanding between ethnic groups and the entire community. 1 lecture.

#### **Eth S 114 Racism in American Culture (3)**

Survey and analysis of racism in the development of American institutions and its effect upon minority ethnic groups and society. 3 lectures.

#### **Eth S 210 Cultural Heritage (3)**

History and culture of selected minority groups, their role in and contributions to the American cultural heritage. Total credit limited to 9 units. 3 lectures.

### **FINANCE AND PROPERTY MANAGEMENT**

#### **FPM 201 Survey of Securities Investments (3)**

Security types available for investment, sources of investment information, operation of security markets. Basic types of approach to investment determination, fundamental and technical approaches. 3 lectures.

#### **FPM 330 Real Estate Principles (4)**

Introduction to the field of real estate providing a basic background for further study. Includes legal aspects, financing, valuation, economics, public control, title insurance and escrow, closing, safe-guards for the buyer of real estate, investment, and leasing. 4 lectures. Prerequisite: Bus 201 or 207.

**FPM 331 Real Estate Practice (4)**

Practical aspects of the real estate business: licensing, office management, selling, contracts and leases, advertising and public relations, financing, escrow, taxation, insurance, business opportunities, property management, exchanging, syndication and investment. 4 lectures. Prerequisite: FPM 330.

**FPM 332 Real Estate Finance (4)**

Analysis of the relationship between national and local money markets. Real estate financing techniques, sources of funds, government participation, legal instruments of finance. 4 lectures. Prerequisite: FPM 330.

**FPM 333 Real Estate Appraisal (4)**

Cost, market, and income approaches to valuation. Appraisal process for urban residential and investment properties. 4 lectures. Prerequisite: FPM 330.

**FPM 334 Real Estate Investment (4)**

Effects of federal, state and local taxes on investment transactions. Intensive investigation and computer analysis of urban investment opportunities. Problems in exchanging and property management. 4 lectures. Prerequisite: FPM 330, FPM 332 and/or 333 recommended.

**FPM 342 Financial Management (4)**

Theory and applications of financing business operations. Financial management of current and fixed assets from internal and external sources. Analysis, planning, control, and problem solving. 4 lectures. Prerequisite: Math 221, Actg 301.

**FPM 411 Security Analysis and Portfolio Management (4)**

Analysis of securities, markets, and valuation. Security price movements related to money and capital market factors and corporate events. Portfolio planning, risk, media, and objectives of individual and institutional investors. 4 lectures. Prerequisite: Econ 337, FPM 342, Stat 252.

**FPM 412 Law of Real Property (4)**

Legal problems of acquisition, ownership and transfer of real property. Leases, liens, taxes, homestead, environmental law, easements and zoning. 4 lectures. Prerequisite: Bus 201 or 207.

**FPM 420 Management of Financial Institutions (4)**

Analysis of practices and policies of financial institutions. Commercial banks, thrift institutions, insurance companies, investment bankers, and security dealers. Management policies resulting from the legal, competitive and economic environment in which each type of institution operates. 4 lectures. Prerequisite: Econ 337, FPM 342.

**FPM 430 International Business Finance (4)**

Financial management of international business. Topics include the international capital and money markets, international financial institutions, special problems in evaluating direct foreign investment, and financial techniques used in international business operations. 4 lectures. Prerequisite: FPM 342.

**FPM 466 Financial Management II (4)**

Development of analytical and decision-making techniques in applying financial theory to business management problems. Cost of capital, capital structure, capital budgeting, risk and valuation theory. Analysis of cases to emphasize practical problems. 4 lectures. Prerequisite: FPM 342, Econ 337.

**FPM 480 Advanced Seminar in Investment (4)**

A seminar covering current topics in investments. An in-depth analysis of the efficient markets hypothesis and capital market theory. 4 lectures. Prerequisites: FPM 411.

## FOOD SCIENCE

### FdSc 101 Survey of Food Industry (2)

Introductory course including size, distribution, major production areas of the food processing industry. 2 lectures.

### FdSc 122 Introductory Food Engineering (4)

Processing equipment, mechanical principles and automatic controls, physical properties of steam, fluids and heat transfer. 3 lectures, 1 laboratory.

### FdSc 123 Elements of Food Preservation (3)

Principles of food preservation including canning, freezing, dehydration, fermentation and concentration. Credit not allowed for students having credit in FdSc 230. Students are required to meet sanitation and safety regulations in processing laboratories. 2 lectures, 1 laboratory.

### FdSc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading. Prerequisite: Permission of instructor.

### FdSc 209 Meat Procurement and Use (3)

Selection, identification and cutting of meat. Physical and chemical composition of meat and its relationship to flavor, tenderness, nutritional value and related subjects. Credit not allowed for students having credit in FdSc 210. Students are required to meet sanitation and safety regulations in laboratories. 2 lectures, 1 laboratory.

### FdSc 210 Meats (3)

The meat industry. Processing methods and operations. Practice in slaughtering and cutting beef, pork and lamb. Meat inspection, grading, composition, curing, preservation and related topics. Credit not allowed for students having credit in FdSc 209. Students are required to meet sanitation and safety regulations in processing laboratories. 2 lectures, 1 laboratory.

### FdSc 212 Meat Classification and Grading (2)

A comprehensive and detailed study of those factors related to carcass quality, conformation, and yield. Judging of carcass and wholesale cuts. Field trip to meat packing plants is required. 1 lecture, 1 laboratory. Prerequisite: FdSc 210.

### FdSc 221 Unit Processing Operations (3)

Thermal processing procedures for fruits, vegetables and specialty items. Students are required to meet sanitation and safety regulations in processing laboratories. 2 lectures, 1 laboratory. Prerequisite: FdSc 123 or 230.

### FdSc 222 Unit Processing Operations (3)

Processing procedures for frozen foods, juices, jams, jellies, specialty foods and by-product utilization. Students are required to meet sanitation and safety regulations in processing laboratories. 2 lectures, 1 laboratory. Prerequisite: FdSc 123 or 230.

### FdSc 223 Unit Processing Operations (3)

Processing procedures for dehydrated fruits, vegetables and specialty items, as well as the concentration of liquids. Students are required to meet sanitation and safety regulations in processing laboratories. 2 lectures, 1 laboratory. Prerequisite: FdSc 123 or 230.

### FdSc 230 Elements of Food Processing (4)

Principles of unit operations in food processing covering canning, freezing, dehydration, fermentation and concentration. Food quality and spoilage. For non-food processing majors. Credit not allowed for students having credit in FdSc 123. Students are required to meet sanitation and safety regulations in processing laboratories. 3 lectures, 1 laboratory.

**FdSc 233 Processed Food Inspection (3)**

Food laws and regulatory agencies concerning the food industry and consumer protection. Fundamentals, principles and procedures for inspecting processed foods based upon federal, state and industry grades. 3 lectures.

**FdSc 321 Food Quality Control (3)**

Methods of analyzing the physical and chemical properties of foods used in the food plant quality control and product development laboratory. Includes organization of the laboratory. 2 lectures, 1 laboratory. Prerequisite: Chem 121.

**FdSc 331 Sanitation and Waste Disposal (3)**

The organization, management and operation of a food plant sanitation and waste disposal program. Field trips required. 3 lectures. Prerequisite: Bact 221.

**FdSc 332 Statistical Quality Control (3)**

The application of statistical methods in quality control programs and evaluation of operations. Calculator required. 3 lectures. Prerequisite: Junior standing.

**FdSc 336 Packaging (3)**

Study of packaging materials, packages and packaging methods applicable to a variety of processed foods. 3 lectures. Prerequisite: Junior standing.

**FdSc 338 Sausage, Smoked and Canned Meats (3)**

The manufacturing of processed meats. Product formulation, curing, smoke house operation. Field trips required. 2 lectures, 1 laboratory. Prerequisite: FdSc 210 or 209.

**FdSc 341 Wines and Fermented Foods (3)**

Methods of production and testing of beer, wines and fermented foods. Field trips required. 3 lectures. Prerequisite: Junior standing.

**FdSc 361 Meat Packing By-Products (2)**

Value, origin, classification and uses of meat by-products. Investigation of scientific principles and manufacturing processes. Field trips required. 1 lecture, 1 activity. Prerequisite: Junior standing, FdSc 210 or 209.

**FdSc 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading. Prerequisite: Permission of instructor.

**FdSc 421 Advanced Food Processing (3)**

Food processing operations with problems involving physical and chemical action of the processes. Field trips required. 2 lectures, 1 laboratory. Prerequisite: Junior standing, FdSc 221, 223.

**FdSc 422 Food Composition Science (3)**

Function and properties of carbohydrates, proteins, fats, pigments and other food ingredients used in the formulation and processing of foods. 2 lectures, 1 laboratory. Prerequisite: Junior standing, Chem 121, FdSc 123 or 230.

**FdSc 425 Food Evaluation (3)**

Characteristics of food color, consistency, texture and flavor. Sensory evaluation and grading, food acceptance testing and statistical analysis of data. 2 lectures, 1 laboratory. Prerequisite: Junior standing.

**FdSc 431 Advanced Meats (3)**

Physical and chemical properties of meats and meat products. Quality control and special problems associated with the processing and distribution of meats. 2 lectures, 1 laboratory. Prerequisite: Junior standing, FdSc 210 or 209.

**FdSc 433 Food Processing Management (3)**

Food plant layout and flow lines, evolutionary operations technique, unit cost accounting, work simplification and scheduling. 2 lectures, 1 laboratory. Prerequisite: Junior standing, FdSc 122, FdSc 123 or 230.

**FdSc 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**FdSc 463 Undergraduate Seminar (2)**

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in his chosen field. Credit/No Credit grading. 2 lectures. Prerequisite: Senior standing.

**FdSc 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**FdSc 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

**FdSc 581 Graduate Seminar in Food Processing (3)**

Current findings and research problems in the field and their application to the industry. 3 lectures. Prerequisite: Graduate standing and permission of instructor.

## FOREIGN LANGUAGE

**ForL 101, 102, 103 Foreign Language (3) (3) (3)**

Organized group instruction arranged for students who wish to acquire basic skill in a foreign language indicated by subtitle. Not open for credit by examination. To be taken in numerical sequence. 3 lectures.

**ForL 250 Potpourri of Languages (2)**

Opportunity to gain insight into some of the major world languages and their cultures. Language function, vocabulary, philosophy, culture, and brief linguistic aspects of such languages as French, German, Spanish, Mandarin Chinese, Japanese, and others will be stressed. Each language represented by a native speaker whenever possible. 2 lectures.

**ForL 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## FRENCH

**Fr 101, 102, 103 Elementary French (5) (5) (5)**

For beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill required. To be taken in numerical sequence. 5 lectures.

**Fr 201, 202, 203 Intermediate French (3) (3) (3)**

Review of French grammar and practice in writing and oral expression based on social and cultural values. Sequence courses. 3 lectures. Prerequisite: Fr 103 or permission of instructor. Simultaneous enrollment in Fr 221, 222, 223 is recommended.



**Fr 221, 222, 223 French Conversation (2) (2) (2)**

Current idiomatic usage with emphasis on contemporary culture. Compositions to supplement oral classroom practice. 2 lectures. Prerequisite: Fr 103 or permission of instructor. Simultaneous enrollment in Fr 201, 202, 203 is recommended.

**Fr 305 Readings in French Literature (3)**

Understanding critical analysis and oral discussion of poetry, essays, novels, plays. Each course will have a subtitle descriptive of the content. May be repeated to 9 units. 3 lectures. Prerequisite: Fr 203 or equivalent.

**Fr 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## **FRUIT SCIENCE**

**FrSc 123 Beekeeping (3)**

Practical studies and exercises in the handling of honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Bee inspection and disease detection. 2 lectures, 1 laboratory.

**FrSc 131 Pomology (4)**

History and outlook for California fruit growing. Apple, fig, pear, quince, persimmon and pomegranate production practices. Field laboratories in orchard management practices, tree and fruit identification, harvesting, grading and packing of university orchard products. 3 lectures, 1 laboratory. Credit will not be allowed for both FrSc 131 and 230.

**FrSc 132 Pomology (4)**

Planting and planning the deciduous orchard. Apricot, cherry, peach, olive, plum and prune production practices with special emphasis on pruning trees and grapevines. 3 lectures, 1 laboratory. Prerequisite: FrSc 131.

**FrSc 133 Pomology (4)**

Production practices common to deciduous nut crops produced in California. Normal spring cultural problems including thinning and spraying. Small fruit culture. 3 lectures, 1 laboratory. Prerequisite: FrSc 132.

**FrSc 230 California Fruit Growing (4)**

Production practices, areas of production, suitable varieties, harvest and processing of important deciduous and subtropical fruit crops. Methods of propagation and training. 3 lectures, 1 laboratory. Credit will not be allowed for both FrSc 131 and FrSc 230.

**FrSc 231 Viticulture (4)**

A comprehensive study of growing wine, raisin and table varieties of grapes. Techniques in harvesting and handling, utilizing the university planting. 3 lectures, 1 laboratory.

**FrSc 232 Fruit Plant Propagation (4)**

Propagation by seed, cuttings, layering, grafting, and budding. Rootstocks for deciduous fruits, commercial nursery practices. 3 lectures, 1 laboratory. Prerequisite: FrSc 133 or 230.

**FrSc 324 Tropical Fruit and Nut Production (4)**

Common practices in producing tree and fruit crops of economic importance in tropical areas—cocoa, tea, coffee, pineapple, oil palm, bananas, dates and papaya. 3 lectures, 1 activity.

**FrSc 331 Advanced Viticulture (4)**

Commercial production practices, mechanization and processing. Utilization of university vineyards for propagation, planting, training and pruning of grape vines. 3 lectures, 1 laboratory. Prerequisite: FrSc 231.

**FrSc 332 Citrus and Avocado Fruit Production (4)**

Growing and marketing oranges, lemons, grapefruit, tangerines, limes and avocados. Minor citrus species, rootstocks and ornamental types are also included. Orchard practice. A field trip to a major California production area is required. 3 lectures, 1 laboratory. Prerequisite: FrSc 133.

**FrSc 421 Advanced Pomology (3)**

Storage problems, post-harvest physiology, environmental factors affecting fruit development. Maturity standards. Two-day field trip required. 2 lectures, 1 laboratory. Prerequisite: FrSc 133.

**FrSc 436 Orchard Management (4)**

Organization and management of labor and equipment in field and processing operations. Production problem analysis. Advanced work in production management. Job instruction training. 3 lectures, 1 laboratory. Prerequisite: FrSc 421.

**FrSc 521 Advanced Fruit and Nut Crop Production (4)**

Advanced commercial production and management techniques. Use of mechanical aids and harvesters as related to size of crops, harvesting, and post-harvest handling. 3 lectures, 1 laboratory. Prerequisite: Permission of instructor.

**FrSc 581 Graduate Seminar in Fruit Production (3)**

Group study of current problems of fruit production; current experimental and research findings as applied to production and marketing. 3 lectures.

## **GEOGRAPHY**

**Geog 150 Human Geography (4)**

Introduction to the concepts, techniques, and tools in geography. Survey of the field of geography with attention focused on man's adaptation to his environment and his role in changing the face of the earth. 4 lectures.

**Geog 215 Man's Impact on the Earth (3)**

Short history of major attitudes toward nature; problems stemming from the interactions of population growth, technology, and natural resources; transformation of natural landscapes into cultural landscapes. 3 lectures.

**Geog 250 Physical Geography (4)**

Distribution and interrelationships of the earth's physical phenomena. Landforms, weather and climate, vegetation and soils. Field trips, atlas work, weather, and topographic maps. 4 lectures.

**Geog 305 Political Geography (3)**

Spatial influences on man's political behavior. Geopolitics, boundaries, significance of resources on power politics, internal spatial structure of the nation-state, relationships between nation-states. 3 lectures. Prerequisite: Pol Sc 201 or equivalent.

**Geog 308 Global Geography (3)**

Survey of man's utilization and occupation of the earth. Interrelations of human life and elements of natural dependence of nations, and world trade. Supporting power of geographical environment. 3 lectures.

**Geog 310 Urban Geography (3)**

Presentation of geographic concepts, principles, and generalizations related to urban functions, forms, distribution, and growth. Location, areal extent, and interaction among the various urban functions. 3 lectures.

**Geog 315 Economic Geography (3)**

Man's utilization of the natural environment. Spatial aspects of production, distribution, and consumption of commodities from the earth. 3 lectures. Prerequisite: Econ 201 or equivalent.

**Geog 320 Geography of Hunger (3)**

A geographic analysis of the world problem of hunger that considers the factors of environmental deterioration, energy deficiencies, the Green Revolution, and rapid population growth. The emphasis will focus upon the underdeveloped world and the cultural and physical restraints it must overcome to adequately feed a growing population. 3 lectures.

**Geog 340 Geography of California (3)**

The physical environment of California; patterns of settlement and economic development; current problems. 3 lectures.

**Geog 350 Geography of the United States (3)**

The people, land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. 3 lectures.

**Geog 401 Area Geography (3)**

Detailed study of geographic characteristics of a selected world area. Each time the course is offered it will bear a subtitle descriptive of the particular world area studied. 3 lectures. May be repeated to a total of 12 units. Prerequisite: One course in geography.

## **GEOLOGY**

**Geol 201 Physical Geology (3)**

Processes responsible for the earth's present characteristics. Mountain building, metamorphism, igneous activity, depositional agencies, sedimentation. Examples from local area. Topographical and geological maps. Rocks and minerals. 3 lectures.

**Geol 202 Geologic History of North America (3)**

Principles of historical interpretation of rocks and earth structures. Age of the earth and dating methods. Origin of the gross structure of the earth. Geologic evolution of North America in terms of changing landscapes, climates, and tectonic patterns. 3 lectures. Prerequisite recommended: Geol 201.

**Geol 203 Introductory Paleontology (3)**

The fossil record. Mechanisms and patterns of evolution. Adaptation of ancient organisms to their environments. Fossils in the interpretation of earth history. Important events in the history of life. Historical development of the major groups of invertebrates, vertebrates, and plants. 3 lectures.

**Geol 204 Geologic History of California (3)**

Development of California through geologic time. Where and why the rocks appeared. Movement on faults, and mountain building. Geologic processes at work today and yesterday. Relationship of California geology to the rest of the world. 3 lectures. Prerequisite: Geol 201 recommended.

**Geol 205 Earthquakes and Earth Hazards (3)**

Plate tectonics, seismicity and faulting. Quake mechanisms, intensity and magnitude. Measurement and prediction. History. Prevention and planning. Related geological effects. 3 lectures.

**Geol 206 Geologic Excursions (1)**

Field trips to places of geologic interest. Class schedule will indicate destinations of the trips. Students provide their own transportation, food, and camping equipment. Course may be repeated for a maximum of 3 units. Offered on a credit-no-credit basis. 1 laboratory. Recommended prerequisite: Geol 201, 202, or 204.

**Geol 211 Cities and Geology (3)**

Relation of city sites to geology. Planning and geology. Hydrogeology. Foundations of cities. Excavations. Building materials. Urban geological hazards. Case histories and lessons for the future. 3 lectures.

#### **Geol 241 Physical Geology Laboratory (1)**

Properties, identification, and origin of earth materials. Interpretation of topographic maps, aerial photos, geologic maps, scale models, and field observations in terms of the effect of geologic processes on the earth's surface, internal structure, and man's use of the earth. 1 laboratory. Prerequisite or concurrent: Geol 201.

#### **Geol 302 Geological Resources (3)**

Nature of the planet's natural mineral resources. Mode of occurrence, geology, origins and quantity of ores, fossil fuels, and industrial minerals. Exploration methods and prospecting. The world supply of geological resources. 3 lectures. Prerequisite: Introductory science course.

#### **Geol 321 Marine Geology (4)**

Techniques of ocean floor exploration, nearshore sedimentary processes and shoreline evolution, continental margin sediments and geologic history, ocean floor topography and sediments, origin and evolution of ocean basins, physical resources of the ocean. 3 lectures, 1 activity. Prerequisite: Geol 201 or consent of instructor.

## **GERMAN**

#### **Ger 101, 102, 103 Elementary German (5) (5) (5)**

For beginners. Class practice in pronunciation, sentence structure, reading, writing and basic conversation. Laboratory drill required. To be taken in numerical sequence. 5 lectures.

#### **Ger 201, 202, 203 Intermediate German (3) (3) (3)**

Review of German grammar and practice in writing and oral expression based on social and cultural values. Sequence courses. 3 lectures. Prerequisite: Ger 103 or permission of instructor. Simultaneous enrollment in Ger 221, 222, 223 is recommended.

#### **Ger 221, 222, 223 German Conversation (2) (2) (2)**

Current idiomatic usage with emphasis on contemporary culture. Compositions to supplement oral classroom practice. 2 lectures. Prerequisite: Ger 103 or permission of instructor. Simultaneous enrollment in Ger 201, 202, 203 is recommended.

#### **Ger 301, 302 Scientific German (4) (4)**

Short, intensive grammar. Emphasis on reading of scientific German materials and texts. Translation projects in the field of student's choice. To be taken in numerical sequence. 3 lectures, 1 activity.

#### **Ger 305 Significant Writers in German (4)**

Representative writers or literary period. Each course will have a subtitle descriptive of the content. May be repeated to 12 units. 4 lectures. Prerequisite: Ger 203 or equivalent, or instructor's consent.

#### **Ger 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## **GRADUATE STUDIES—BUSINESS**

#### **GSB 511 Accounting for Management Planning and Control (4)**

Accounting issues applied to management planning control and information systems in industry, government and nonprofit organizations. Problem analysis in budgetary control, standard and direct costing, decentralized profit control, inter-division transfers and long-range planning. 4 lectures. Prerequisite: Classified graduate standing.

#### **GSB 512 Accounting Theory and Policy (4)**

Selected issues in the development and application of accounting theory and policies within the economic, political, and social framework. External influences on financial reporting. Translation of theory into practice. 4 lectures. Prerequisite: GSB 511.

**GSB 521 Marketing Management (4)**

Detailed analysis of marketing management: Policy planning strategy formulation; organization; directing; coordinating marketing activities. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 522 Marketing Management Seminar (4)**

Practice in the application of analytical tools and techniques to current and potential marketing problems. 4 meetings. Prerequisite: GSB 521.

**GSB 531 Business Finance (4)**

Analysis of acquisition and administration of assets and liabilities by corporations. Theory and practices underlying financial decision-making. Problems in financial management: interface with production and marketing; capital budgeting; optimal capital structure; working capital management; asset valuation; and dividend policy. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 532 Money and Capital Markets (4)**

Money and capital markets and financial intermediaries. Factors that affect supply, demand, prices, and interest rates in these markets. 4 lectures. Prerequisite: GSB 531.

**GSB 533 Seminar in Investments (4)**

Stock, bond and options market. Emphasis on operations of markets, the efficient markets hypothesis, and portfolio theory. Prerequisite: GSB 531.

**GSB 541 Microeconomics (4)**

Analysis of demand, production, cost functions, behavior of competitive markets, market imperfections and distribution of income. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 542 Seminar in Economic Forecasting (4)**

Short- and long-term forecasts of business activity through the construction of econometric or time series models. Analysis of models in forecasting exercises. Prerequisite: GSB 541.

**GSB 551 Quantitative Methods in Decision-Making (4)**

The concepts and techniques of quantitative methods relating to management decision-making process. Review of basic quantitative and statistical concepts. Development of quantitative techniques utilized in the business organization today for decision-making and planning purposes and investigation of the methodology for the future. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 552 Operations Management and Information Systems (4)**

The development of the production function and its interaction with other functional areas in the organization. Application of quantitative and statistical methods to the management planning and decision-making function in operations management. The Management Information System and its relation to the decision-making process. Extension of the methods of problem solving to functional areas other than the formal production process and to industry with no production components. 4 lectures. Prerequisite: Classified graduate standing and GSB 551.

**GSB 561 Organizational Behavior (4)**

Examination of major psychological theories and conceptual constructs relating to behavior in modern organizations. Leadership styles, group dynamics, motivation, communication, perception, conflict resolution, and attitude change are related to the behavioral implications affecting organizational effectiveness and performance. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 562 Seminar in Labor Relations and Collective Bargaining (4)**

Labor relations and collective bargaining in the public and private sector. Relationships between unions, organizations and the government and an understanding of the causes of conflict, and ways to resolve it. Emphasis on current practices, procedures, and laws. Prerequisite: Classified graduate standing.

**GSB 563 Seminar in Organizational Change and Development (4)**

Methods of achieving organizational effectiveness developed by organizational science practitioners. Personal growth and goal setting, team development, intergroup conflicts, surveyed as areas needing integration through action programs designed for production and people effectiveness. Prerequisite: GSB 581.

**GSB 571 Business and Society (4)**

The business organization as a social, economic, and legal institution with social-ethical responsibilities. Analysis of the business organization's interrelationships with competitors, government, pressure organizations, consumers, and employees in the social, political, and legal environment. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 572 International Business and Operations (4)**

Buying, selling, and producing abroad. International distribution channels. Foreign domestic organizations. Foreign subsidiaries and divisions. Multinational money markets. Import taxes, governmental subsidies and differential freight rates. U.S. tax treatment of operations and U.S. citizens abroad. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 581 Management and Organizational Theory (4)**

Examination of major theories and conceptual constructs relating to the operating requirements of complex organizations, including manufacturing, service, and nonprofit organizations; historical development of theory and practice; managerial functions and processes. Current issues and actual cases. 4 lectures. Prerequisite: Classified graduate standing.

**GSB 582 Organizational Analysis, Planning and Decision Making (4)**

Organizational analysis strategies and constructs; environmental, technological, and behavioral imperatives influencing organizational objectives, structures, and design. Strategic and tactical planning concepts and criteria relating to industrial, governmental and nonprofit organizations. Problem definition and decision-making, including diagnostic analysis, causation analysis, alternative formulation, and optimization criteria and techniques. 4 lectures. Prerequisite: GSB 581.

**GSB 583 Business Policy Strategy (4)**

Case study of policy formulation, objective definition, strategy, control and integration of total organization imperatives. Emphasis on analysis of problems faced by chief executive officers in policy implementation, coordination, and appraisal of organization performance. Policy issues relating to environmental aspects, growth strategies, technological diversification, and alternative strategies. 4 lectures. Prerequisite: All required CBOK and Advanced Study Courses taken prior to spring quarter.

**GSB 584 Seminar in International Management (4)**

Examination of organizational and behavioral implications related to the management of international operations. Evaluation of organizational structure, design, process, change, and managerial strategies in the context of differential economic, cultural, technological, political and social environments, and value systems. Analysis of management concepts and performance criteria in international organizations. Prerequisite: GSB 581.

## **GRAPHIC COMMUNICATIONS**

**GrC 101 Introduction to Graphic Communications (2)**

Orientation to the Graphic Communications program. Examination of the industry, its traditions, technological changes, and employment opportunities. 2 lectures.

**GrC 111 Substrates and Ink (4)**

Manufacturing processes. Testing, procurement, pricing, paper classifications and measurement. Application to end use. 3 lectures, 1 activity.

**GrC 122 Design with Type (5)**

Introduction to typography. Type classification, identification, and selection. Copyfitting, markup systems, and proofreading. Fundamentals of layout and design for print media. 3 lectures, 2 laboratories.

**GrC 123 Binding and Finishing (3)**

Effective imposition techniques. Cutting, folding, assembling of folded material, finishing operations. Case and perfect bookbinding. 2 lectures, 1 laboratory.

**GrC 127 Graphic Arts Processes (3)**

Introduction to the graphic arts. Printing processes, design, layout, composition, presswork, cold type, binding, silk screen, offset, photography, and duplicating processes. For non-majors. 1 lecture, 2 laboratories.

**GrC 132 Letterpress (3)**

Handfed and automatic platen press operation. Makeready, lockup, imposition, scoring and perforating. Inking systems. 2 lectures, 1 laboratory.

**GrC 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**GrC 204 Introduction to Printing Management (3)**

Structure of the industry. Production systems analysis, trade customs, and applied management. 3 lectures.

**GrC 223 Copy Preparation (3)**

Preparation of line and tone copy for the reproduction processes. Designing roughs and visuals and preparation of single and multi-color mechanicals. Production planning. 2 lectures, 1 laboratory.

**GrC 224 Composing Machines (4)**

Introduction to composition systems. Newspaper, bookwork, magazine, and commercial composition. 2 lectures, 2 laboratories. Prerequisite: GrC 122 or consent of instructor.

**GrC 227 Process Camera (5)**

Characteristics of photographic materials and equipment for the graphic arts. Theory and practice in the use of the process camera for line, halftone and color separation photography. Densitometry. Sensitometry. 2 lectures, 3 laboratories. Prerequisite: Sophomore standing or consent of instructor.

**GrC 228 Image Assembly and Platemaking (4)**

Planning for lithographic press plates. Ruling, scribing, opaquing, and retouching negatives and positives. Preparation of supports for black and white and color imaging. Image assembly for large presses. Black and white and color proofing techniques. Preparation of various offset plates. 2 lectures, 2 laboratories. Prerequisite: GrC 227 or consent of instructor.

**GrC 229 Offset Lithographic Presswork (5)**

Theory and practice in the use of sheet-fed offset presses for both single color and multicolor printing. Investigation of feeding, printing and delivery systems. Dampening and inking systems. Process color printing. Press quality control. 3 lectures, 2 laboratories. Prerequisite: GrC 228 or consent of instructor.

**GrC 233 Relief Printing Specialties (3)**

Automatic and cylinder presswork. Halftones, process color printing. Die cutting, creasing, foil stamping, blind embossing and varnishing. 1 lecture, 2 laboratories. Prerequisite: GrC 132.

**GrC 301 Composition Systems (4)**

Modern composition systems for display and text. First and second generation phototypesetting machines. Computerized photocomposition systems. 2 lectures, 2 laboratories. Prerequisite: GrC 224.

**GrC 302 Technical Basics for Printing (3)**

Application of electronics, optics, and other selected areas of science and technology in the printing and publishing industries. Advanced instrumentation, control, actuation, and systematization for graphic arts operations. 3 lectures.

**GrC 303 Estimating (3)**

Estimating various kinds of printing produced by the major processes. Use of standard price catalogs. Analysis of material, labor, and machine cost factors. 3 lectures. Prerequisite: GrC 111 or junior standing.

**GrC 304 Theory of Color (2)**

Light and color theory. Understanding of the physical, chemical, and psychological concepts of color. Color systems. Application of color theory to full-color printing. 2 lectures.

**GrC 312 Theory of Lithography (3)**

Theories of the lithographic process in relation to chemical and physical factors. Film emulsion and bases, darkroom chemistry and processing, lithographic plate bases, coatings and processing, pH of solutions, lithographic press chemistry, blankets and schematics. 3 lectures.

**GrC 323 Pre-Separated Art for Camera (3)**

Manual preparation and separation of line and continuous tone images for multicolor reproduction. Preparation of complex full-color mechanical layouts. 1 lecture, 2 activities. Prerequisite: GrC 223.

**GrC 326 Printing Equipment Management (3)**

Procedures in designing, maintaining and decision making for printing equipment including pneumatics, hydraulics, mechanical and electrical systems. Pollution, safety and training in the graphic communications industry. 2 lectures, 1 activity. Prerequisite: GrC 204 and junior standing.

**GrC 330 Packaging Substrates (3)**

Application of substrates and material design for consumer, industrial, and military packaging. Paper, paperboard, plastic, metal, glass, laminates, and other applicable materials. Physical testing and characteristics. Graphic design implementation of each substrate. 2 lectures, 1 laboratory. Prerequisite: Junior standing or instructor approval.

**GrC 333 Plant Organization and Layout (3)**

Printing plant design and layout. Production analysis, work flow patterns, and utilization of space. Organization of plant services. 2 lectures, 1 activity.

**GrC 335 Line and Halftone Media (5)**

Preparation and evaluation of original art copy for commercial use. Laboratory problems in drawing and layout for single and multiple color runs. Study of various approaches to registration; uses of color and texture in art copy. 2 lectures, 3 laboratories.

**GrC 357 Screen Processes (2)**

Screen process reproduction methods with applications to industry and communications. Includes paper, tusche, knife-cut and photographic stencils. Printing mediums, surfaces, and industrial applications such as printed circuits and packaging. 2 laboratories. Prerequisite: GrC 228 or consent of instructor.

**GrC 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.



**GrC 401 Printing Sales (4)**

Sales management, salesmanship, sales forecasting techniques, and marketing of printed products. Purchasing. 4 lectures. Prerequisite: Senior or advanced junior standing.

**GrC 408 Newspaper and Publications Management (3)**

Analysis of newspaper and publications production systems. Organization of the production function. Personnel and industrial problems peculiar to the industry. 2 lectures, 1 laboratory. Prerequisite: Senior standing or consent of instructor.

**GrC 411 Estimating, Pricing and Costing (4)**

Development of printing plant estimating standards. Coordination of estimating and sales to printing market trends. Printing industry management ratios related to management and profit strategy. Costing techniques in the printing plant. Estimating for web processes including color impositions. Computer applicators to estimating. 4 lectures. Prerequisite: GrC 303.

**GrC 416 Web Printing (5)**

Theory and practice in the use of web presses for letterpress, offset, rotogravure, and flexographic printing. Applications for newspapers, packaging, business forms, magazines, books, catalogs and advertising materials. 3 lectures, 2 laboratories. Prerequisite: GrC 229.

**GrC 421 Printing Management (4)**

Principles and applications of printing production forecasting. Functions of printing production control. Printing production records. Establishment of inspection standards. Judgment and measurement inspection. Instruments for quality control in the printing industry. 3 lectures, 1 activity. Prerequisite: GrC 204.

**GrC 422 Printing Management (3)**

Applied techniques of printing plant personnel management. Investigation and determination of job descriptions, testing for staff and line employees. Setup of graphic arts in-plant training programs. Evaluation procedures for personnel working in the printing facility. Printing industry association relationships. 3 lectures. Prerequisite: GrC 204.

**GrC 423 Printing Management (4)**

Trends in the graphic arts labor movement. Graphic arts labor unions. Collective bargaining and grievance procedures practiced in the printing industry. Administration of the labor contract by printing plant supervisor. Study of industry-specific case problems. 3 lectures, 1 activity. Prerequisite: GrC 204.

**GrC 429 Advanced Composition Systems (3)**

CRT composition, character generation, pagination, and computer utilization in modern graphic arts composition. 2 lectures, 1 laboratory. Prerequisite: GrC 301.

**GrC 431 Package Estimating (3)**

Principles of packaging, economics and cost determination. Establishment of unit cost, subcontracting, overhead and profit. Estimating costs of converting operations. 3 lectures. Prerequisite: GrC 330 or instructor approval.

**GrC 437 Consumer Packaging (3)**

Consumer requirements including utility and protection. Consumer motivation. Graphics, size, shape, and legal ramifications. 2 lectures, 1 activity. Prerequisite: Mktg 204, GrC 431 or instructor approval.

**GrC 439 Advanced Line and Halftone Media (5)**

Complex and experimental art media and their limitations for use in line and halftone reproductions by the major printing processes. 2 lectures, 3 laboratories. Prerequisite: GrC 335.

**GrC 459 Graphic Communication Developments (2)**

Developments and trends in processes, methods, materials and equipment used in graphic communication. 2 activities. Prerequisite Senior standing or consent of instructor.

#### GrC 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

#### GrC 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## HISTORY

#### Hist 101, 102, 103 History of Western Civilization (3) (3) (3)

Development of western civilization from earliest times to the present. Political, economic, social, intellectual, and religious contributions of the various peoples to contemporary life. 3 lectures.

#### Hist 112 History of California (3)

The development of California; government, economy, culture. 3 lectures.

#### Hist 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

#### Hist 201, 202, 203 United States History (3) (3) (3)

A comprehensive survey of the development of the United States from the 15th century to the present. Hist 203 satisfies the general education requirement of Hist 204 for Social Science, Political Science, and History majors. 3 lectures.

#### Hist 204 Growth of American Democracy (3)

The historic backgrounds of present-day economic, political, and social problems. Development of American institutions and ideals. Not open to students with credit in or enrolled in Hist 203. 3 lectures.

#### Hist 205 The United States in World Affairs (3)

The origin, nature, and implementation of U.S. foreign policy since the Second World War. Domestic and international factors relating to U.S. objectives; discussion and analysis of major issues and problems of contemporary U.S. foreign policy. 3 lectures.

#### Hist 206 American Democracy and World Affairs (5)

Combines Hist 204 and 205. Historical significance of American institutions and ideals and the increasing involvement of the United States in world affairs. Not open to students with credit in or enrolled in Hist 203, 204, or 205. 5 lectures.

#### Hist 211 Issues in United States History (3)

Analysis of selected issues in United States civilization from the seventeenth to the twentieth century. Multiple causation as a means of explaining historical change. 3 lectures.

#### Hist 221 Historical Craft (3)

An introduction to research and writing methods in history; a seminar approach to the craft of history. Topics: The nature of historical research, research methods, library facilities, basic bibliography and organization skills, writing techniques. 3 lectures.

#### Hist 270 History through Film (3)

Various historical themes are examined through the medium of film. The influence and overall relationship of films to the societies that produced them are examined. May be repeated to 6 units. 2 lectures, 1 laboratory.

**Hist 301 Historiography (3)**

Theory, interpretation and philosophies of history. 3 seminar meetings. Prerequisite: Hist 221 and junior standing.

**Hist 303 Concepts in World Civilization (4)**

Intercultural and cross-cultural analysis of the human response to political, economic, social, and cultural forces of selected epochs in the history of world civilizations. 4 lectures.

**Hist 305 History of American Agriculture (3)**

Agricultural development with emphasis upon economic, political and social implications. 3 lectures. Prerequisite: Junior standing.

**Hist 306 History of American Technology (3)**

The development of industrial transportation, and agricultural technologies in America. 3 lectures. Prerequisite: Junior standing.

**Hist 311, 312, 313 British History (3) (3) (3)**

History of the English people from the Roman era to the present. Development of law, language, religion, literature, and the struggles for parliamentary government and economic opportunities. 3 lectures. Prerequisite: Junior standing.

**Hist 314 The Middle East (3)**

Islamic civilization, the Ottoman Empire, origins of Pan-Islamism, Arab, Turkish, Iranian nationalism, impact of World Wars I and II, and the background of contemporary problems. 3 lectures. Prerequisite: Junior standing.

**Hist 318 History of Modern Ireland (3)**

A study of Ireland since 1845. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Hist 321 Early Chicano History (3)**

Political, economic and social history of Mexican-Americans from the Colonial period to the late 19th century. 3 lectures. Prerequisite: 3 units of American history.

**Hist 322 Recent Chicano History (3)**

Political, economic and social history of Mexican-Americans in the 20th century. 3 lectures. Prerequisite: Junior standing.

**Hist 325 Ethnic Groups in American History (3)**

Role of ethnic, racial, and religious minorities; their contributions to the political, economic, and social development of American life. 3 lectures. Prerequisite: Junior standing.

**Hist 328 American Indian History (3)**

A historical examination of Native American culture; the topics of conflict and contributions will be emphasized. 3 lectures.

**Hist 329 American Indian Thought (3)**

A study of the cultural, spiritual, and philosophical concepts of several Native American societies; the intellectual and religious influences of Indians upon American society; their adaptation to White domination. 3 lectures. Prerequisite: Junior standing.

**Hist 331 Early Afro-American History (3)**

Political and social history of Afro-Americans from the early 17th century to the end of the Reconstruction. Contributions to American cultural and political life. 3 lectures. Prerequisite: Junior standing.

**Hist 332 Recent Afro-American History (3)**

Political and social history of Afro-Americans from the end of Reconstruction to the present as background of contemporary developments. 3 lectures. Prerequisite: Junior standing and Hist 331.

**Hist 339 Latin American History, Colonial Period (3)**

The mixture of the Spanish, Portuguese and Native American civilizations and the resulting political, economic and cultural situation. Conflicts leading to the independence movements and a description and analysis of those movements. 3 lectures. Prerequisite: Junior standing.

**Hist 340 Latin American History, National Period (3)**

The patterns of Latin America after independence—national, regional, political, economic, cultural. Unity and diversity as it has developed to the present. 3 lectures. Prerequisite: Junior standing.

**Hist 341 Mexican History (3)**

Obtrusion of Spanish institutions on the Mexican civilizations and the subordination of Spanish influence to the dominant Mexican cultures. Diffusion and struggle for identity of the Mexican in North America, progress of his twentieth-century revolt for social equity. 3 lectures. Prerequisite: Junior standing.

**Hist 343 The Classical Age (3)**

The foundations of western civilization; origins and development of the science, technology, philosophy, religion, art, and sociopolitical institutions which produced the modern world; continuity between ancient times and the present. 3 lectures. Prerequisite: Junior standing.

**Hist 346 Medieval Europe (3)**

Medieval society from the emergence of feudalism to the beginning of the Renaissance: triumph of the papacy; development of feudal monarchies and institutions; the crusades; recovery of commerce; rediscovery of Greek thought, and rise of universities. 3 lectures.

**Hist 347 Renaissance and Reformation (3)**

Decline of medieval universalism; rise of commercial capitalism and dynastic nation-states; flowering of the Renaissance; Protestant reformation. Economic, political, social, intellectual, and cultural influences. 3 lectures. Prerequisite: Junior standing.

**Hist 348 Counter-Reformation, Absolutism, and Religious War (3)**

The era of the Counter-Reformation and Divine Right absolutism, religious and dynastic wars and their impact on the political, economic, social, religious and cultural fabric of European civilization. 3 lectures. Prerequisite: Junior standing.

**Hist 349 The Age of Enlightenment and Revolution (3)**

Ancien Regime, Enlightenment, Despotism, and Bourgeois Revolution in the West; political, economic, social, and cultural developments from the beginning of the eighteenth century through the Napoleonic era. 3 lectures.

**Hist 351, 352, 353 Modern European History (3) (3) (3)**

Growth of political institutions; development of national states; imperial rivalries; origins of World War I; peace settlements; totalitarianism; World War II; developments since 1945. 3 lectures. Prerequisite: Junior standing.

**Hist 375 Urban History of America (3)**

Growth and development of American cities from the Colonial period through the 1970s. Includes a comparative analysis of American urban areas with city development in Europe, Asia and Africa. Special emphasis on the evolution of urban culture, assimilation of European ethnic groups, clash of city and rural values, rise of racial ghettos. 3 lectures.

**Hist 381, 382 African History (3) (3)**

Survey of African history from earliest times; ancient African civilizations, Moslem penetration, indigenous kingdoms, European colonialism, rise of African nationalism, development of independent Africa as illustrated by the history of selected countries. 3 lectures. Prerequisite: Junior standing.

**Hist 385 Topics in California History (3)**

In-depth analysis of selected political, economic, and social issues involved in the development of California from the earliest times to the present. 3 lectures.

**Hist 386 The American West (3)**

Development of the Trans-Mississippi West. Consideration given to the various political, economic, social, cultural and religious factors which helped to bring about the end of the so-called frontier. 3 lectures.

**Hist 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

**Hist 401 Colonial America (3)**

Age of exploration; European powers in eastern North America; English settlements; development of the English colonies, with emphasis on Virginia and Massachusetts; proprietary interests; growth of internal control, and colonial conflicts. 3 lectures. Prerequisite: Junior standing.

**Hist 402 American Revolution (3)**

Background of the Anglo-American imperial problem; the War for Independence and internal democratic upheaval of the era; establishment of the new nation, origins of the Constitution, the party system, American foreign policy, the national economy. 3 lectures. Prerequisite: Junior standing.

**Hist 403 Jacksonian America (3)**

Growing nationalism and simultaneous development of sectional rivalries; emerging two-party system; the transportation revolution; early industrialization; and a changing social order. 3 lectures. Prerequisite: Junior standing.

**Hist 404 Civil War and Reconstruction (3)**

Interaction of political, social and economic forces with personalities and ideas in a period in which the political process failed to function. 3 lectures. Prerequisite: Junior standing.

**Hist 405 Rise of Industrial America (3)**

Social, political, and economic history during the latter part of the 19th century. Interaction between rising industrialism and traditional agrarian democracy. Relationship between the industrial system and the values of democratic institutions. 3 lectures. Prerequisite: Junior standing.

**Hist 406 Progressive Era (3)**

Economic, social, intellectual, and political history, and foreign policy. Progressive response to problems of industrialization, agriculture, and urbanization; development of the American corporate business system; era of normalcy and onset of the depression. 3 lectures. Prerequisite: Junior standing.

**Hist 407 Modern America (3)**

Major developments of the mid-twentieth century. Change and growth in domestic and foreign policies; the Depression, New Deal, World War II, Cold War. Problems of world leadership and contemporary domestic problems. 3 lectures. Prerequisite: Junior standing.

**Hist 415 East Asian Civilization (3)**

A survey of the central ideas and institutions which have shaped Chinese, Japanese and Korean civilization since ancient times. Emphasis on cultural themes rather than a political continuum. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Hist 416 Modern Japan (3)**

Japan's development as a modern state in the 19th and 20th centuries. Emphasized themes include the conflict of modernity and cultural continuity, the persistence of traditional values and postwar reconstruction of Japanese society. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Hist 417 Modern China (3)**

Analysis of Chinese history in the twentieth century, the conflict between modernity and cultural continuity. The Chinese Communist Party and People's Republic of China since 1949. 3 lectures.

**Hist 423 History in the Elementary School (2)**

Selected history topics taught in grades 4–6 in California, including ethnic Americans, third world cultures and the inter-disciplinary historical method. 2 lectures. Prerequisite: Junior standing.

**Hist 424 Organizing and Teaching History (3)**

Organization, selection, presentation, application, and interpretation of subject matter in history in secondary schools. 3 seminars. Prerequisite: Admission to teacher education program or valid teaching credential.

**Hist 426 Tsarist Russia (3)**

The evolution of Russian autocratic society from the foundation of tsarist absolutism in the fifteenth century to 1917; reaction, reform and revolutionism. 3 lectures. Prerequisite: Junior standing.

**Hist 427 Soviet Russia (3)**

The transformation of Russian autocracy from tsarist to Bolshevik under the impact of World War I and the revolution of 1917; the formative force of Marxism-Leninism, forced collectivization and industrialization, the social engineering of the New Soviet Man; World War II, the Cold War and peaceful coexistence. 3 lectures. Prerequisite: Junior standing.

**Hist 429 History of Communism (3)**

The theory and practice of Marxian Communism since 1848. 3 lectures. Prerequisite: Hist 205.

**Hist 435 Women in History (3)**

Traditional roles and attitudes about women; contributions of individual women; changing conditions and their implications for today's woman. 3 lectures. Prerequisite: Junior standing.

**Hist 437 Nazi Germany (3)**

The intellectual, social and cultural roots of National Socialist ideology and how they combined under the influence of Adolph Hitler to produce the Nazi Revolution. 3 lectures.

**Hist 460 Senior Project (2)**

Selection and completion of a project under faculty supervision. Results presented in a formal report. Minimum of 60 hours time. Prerequisite: Hist 301

**Hist 463 Undergraduate Seminar (2)**

Historical analysis of selected problems and topics for undergraduates. Prerequisite: Hist 301.

**Hist 465 Oral History (3)**

Practical experience in all facets of oral history. Value and tools of oral history, preparation for the interview, interviewing, transcribing, editing the transcript, and preservation and use of the tape and transcript. 3 activities. Prerequisite: Junior standing.

**Hist 470 Selected Advanced Topics (1–3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Hist 590 Seminar in History (3)**

Historical analysis of selected problems and topics. Each seminar will carry a subtitle descriptive of its content. 3 meetings. Maximum of 6 units may be earned. Prerequisite: Graduate standing.

## HOME ECONOMICS

### HE 101 Orientation to Home Economics (2)

Exploration of professional opportunities available in home economics; advantages, disadvantages and the personal and professional qualifications required. Credit-no credit grading only. 2 lectures.

### HE 106 Introduction to Clothing Construction (2)

Basic studies in clothing construction, course designed for those with limited or no previous experience. Not open to students who have completed HE 131. 1 lecture, 1 laboratory.

### HE 121 Introduction to Foods (4)

Formation and illustration of basic concepts and scientific principles in food preparation. Supporting factors necessary for successful meal preparation. 3 lectures, 1 laboratory. Prerequisite: Chem 121.

### HE 122 Design Analysis for Home Economists (3)

Design elements and principles as they apply to all areas of home economics. 2 lectures, 1 two-hour laboratory.

### HE 131 Clothing Construction (3)

Techniques in clothing construction. Emphasis on fabrics, fit and quality construction. 2 lectures, 1 laboratory. Prerequisite: HE 106 or appropriate score on competency test.

### HE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

### HE 203 Consumer Role of the Family (3)

Study of the individual and family as consumers in the consumer marketplace. Sources of consumer protection and recourse. Influence of selected management concepts on consumption patterns. 3 lectures.

### HE 207 Problems of Family Housing (3)

Effects of various housing environments on the dynamics of family life. Emphasis on consumer housing problems. 3 lectures. Prerequisite: Soc 105.

### HE 210 Nutrition (3)

Nutritional needs throughout the life cycle. Chemical composition of foods and their utilization in the body. 3 lectures.

### HE 220 Contemporary Textile Products (3)

Selection, use and care of textiles: apparel, carpets, draperies, upholstery, linens. Legislation as it affects consumers and the industry. 3 lectures.

### HE 224 Creative Textiles (2)

Exploration and development of creative textiles through observations and laboratory experiences. 1 lecture, 1 laboratory. Prerequisite: HE 122 or consent of instructor.

### HE 225 Textile Development and Dyeing (2)

The development of textiles by the use of various fibers; dyeing processes, and construction through observation and laboratory experience. 1 lecture, 1 laboratory. Prerequisite: HE 122 or consent of instructor.

### HE 226 Home Food Conservation (2)

Conservation techniques to obtain maximum control of food quality with most efficient use of time, energy, and economic resources. 1 lecture, 1 two-hour laboratory. Prerequisite: HE 121.

**HE 237 Children's Clothing (3)**

Design, construction, and selection of children's clothing. Emphasis upon the psychological, physiological, and developmental needs of various age levels. Comparative analysis of self-made and ready-to-wear clothing. 2 lectures, 1 laboratory. Prerequisite: HE 131 or consent of instructor.

**HE 241 Flat Pattern (3)**

Pattern design analyzed through the basic techniques of fitting and use of flat pattern. 2 lectures, 1 laboratory. Prerequisite: HE 122 and 131 or consent of instructor.

**HE 242 Interior Design (4)**

Basic interior design dealing with the visual, functional, and consumer aspects of manipulating interior space. Individual creative laboratory experience in solving realistic design problems. 3 lectures, 1 two-hour laboratory. Prerequisite: HE 122 or consent of instructor.

**HE 309 History of Interior Design (3)**

Development of furniture styles and their environments from ancient times to the present. 3 lectures. Prerequisite: Junior standing.

**HE 310 Maternal and Child Nutrition (3)**

Nutritional requirements from conception to adolescence; role of nutrition in normal development. 3 lectures. Prerequisite: HE 210

**HE 315 Textile and Clothing Industries (3)**

Commercial aspects of design, production, development and distribution of textiles and clothing. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**HE 321 Food Management (3)**

Current trends and developments in food management. Food marketing systems, consumption patterns and legislation related to food. Planning, preparing and serving of meals for diverse situations reflecting current meal trends. Emphasis on nutritional, aesthetic, and economic aspects. 1 lecture, 2 two-hour laboratories. Prerequisites: HE 121, 122, 210.

**HE 322 Textiles (3)**

Physical and chemical characteristics of natural and synthetic fibers. Yarns, fabrics, and textile finishes. Application of theory to textile fabrics. Selection, use, and care. 2 lectures, 1 laboratory. Prerequisite: Chem 122 or consent of instructor.

**HE 323 Individual Residential Design (3)**

Design decisions creating an interior and exterior environment expressive of social, functional and aesthetic needs as applied to a mass produced housing unit. 2 lectures, 1 two-hour laboratory. Prerequisite: HE 207, 344 or consent of instructor.

**HE 324 Management of Family Resources (3)**

Application of management principles as they relate to contemporary aspects of family and group living situations. Use of case study method. 3 lectures. Prerequisite: HE 203, or consent of instructor.

**HE 326 Demonstration Techniques (3)**

Development of effective means of communication by use of the demonstration technique, through presentations with evaluations. 3 two-hour laboratories. Prerequisite: Sp 201, HE 331 or consent of instructor.

**HE 328 Advanced Nutrition (4)**

Nutrient requirements of man; factors affecting requirements. Biochemical and physiological functions of nutrients and their interactions in the body. Evaluation of nutritional status. Topics in nutrition research. 4 lectures. Prerequisite: HE 210, Chem 328, Zoo 131.



**HE 331 Household Equipment (4)**

Principles involved in construction, operation, energy consumption, selection, safety, and space utilization of household equipment. 3 lectures, 1 two-hour laboratory. Prerequisite: Junior standing.

**HE 333 Draping (3)**

French draping fundamentals. Designing for the individual and the fabric. Advanced fitting techniques. 1 lecture, 2 laboratories. Prerequisite: HE 241 or consent of instructor.

**HE 334 Special Fabric Construction Techniques (3)**

Selected experiences in clothing construction using a variety of special fabrics. 2 lectures, 1 two-hour laboratory. Prerequisite: HE 131, 322 or consent of instructor.

**HE 341 Dynamics of Clothing (3)**

Socio-psychological, economic and aesthetic aspects of clothing as related to human behavior. 3 lectures. Prerequisite: One course in psychology, Soc 105.

**HE 344 Interior Furnishing Materials and Techniques (3)**

Survey of materials used in floor, wall and window treatments. Practical experiences in specification writing, furniture refinishing, slip covering, and selected window treatments. 2 lectures, 1 two-hour laboratory. Prerequisite: HE 242, HE 322, or consent of instructor.

**HE 348 Advanced Nutrition Laboratory (2)**

Nutrient requirements and their evaluation. Quantitative laboratory techniques used in nutrition research. 2 three-hour laboratories. Prerequisite: HE 328 or consent of instructor.

**HE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing and consent of instructor.

**HE 401 Occupational Training Seminar (3)**

Current developments in the teaching of home economics-related occupations at the secondary level. May be repeated up to 6 units. 3 meetings. Prerequisite: Senior standing or consent of instructor.

**HE 404 Financial Responsibilities of the Family (3)**

Understanding the economic role of the family: factors affecting use of income; cost of goods and services within the U.S. economic system. Opportunity to analyze a family's financial situation and understand how its specific socio-economic level relates to other families. 3 lectures. Prerequisite: HE 324 or consent of instructor.

**HE 410 Community Nutrition (3)**

Problems inherent in improvement of nutrition at the community level. Relation to local, state, and national nutrition programs. Role of the nutritionist in public health, social welfare, agricultural extension, and school lunch program. 3 lectures. Prerequisite: HE 415.

**HE 411 Curriculum and Methods for Homemaking Education (4)**

Development of a timely philosophy in consumer and homemaking education. Classroom management, procedures, curriculum development, teaching aids and evaluating techniques for teaching homemaking in junior and senior high schools, including federally reimbursed programs. Field trips required. 4 lectures. Prerequisite: Consent of instructor.

**HE 412 Home Economics Student Teaching Seminar (3)**

Practices and problems of student teaching in Home Economics. Synthesizes professional study and experience to develop teaching competence. Taken concurrently with student teaching. 3 lectures.

**HE 415 Methods of Teaching Nutrition (3)**

Identification of nutrition learning needs and problems at various stages of the life cycle. Selection of valid content and learning activities for a variety of teaching situations and strategies in community, classroom and clinic. 3 lectures. Prerequisite: HE 328 and Ed 335, and senior standing.

**HE 421 Cultural and Aesthetic Aspects of Food (3)**

Study of psychological, sociological and economic factors that influence the formation of food habits and attitudes. Lab illustrates application of basic principles of food science to food consumption patterns of cultural groups. 2 lectures, 1 laboratory. Prerequisite: HE 321 or consent of instructor.

**HE 422 Advanced Textiles (3)**

Advanced study of fiber structure and fabric properties as related to fabric performance. Laboratory testing of fibers and fabrics. 2 lectures, 1 laboratory. Prerequisite: HE 322

**HE 425 Quantity Food Preparation (3)**

Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. 1 lecture, 2 two-hour laboratories. Prerequisite: Senior standing or consent of instructor.

**HE 426 Food Production Management (3)**

Principles of successful organization and management with their application to the effective operation of food service. Administrative responsibilities of the food service manager. Advance reservation with instructor required. 3 lectures. Prerequisite: Senior standing or consent of instructor.

**HE 427 Equipment and Layout (3)**

Selection, maintenance and arrangement of equipment and furnishings for food service departments with emphasis on materials, construction and specifications. Designated field trips required. 2 lectures, 1 laboratory. Prerequisite: Senior standing or consent of instructor.

**HE 429 Diet Therapy (4)**

Modification of normal food intake and dietary patterns, with emphasis on dietary adjustments necessitated by certain disease processes and conditions. 3 lectures, 1 two-hour laboratory. Prerequisite: HE 348.

**HE 432 Advanced Interior Design (3)**

Individual creative experiences in problems of interior design. Total credit limited to 6 units. 3 two-hour laboratories. Prerequisite: IT 245, HE 309, 323 or consent of instructor.

**HE 433 Historic Costume (3)**

Costumes of the past as related to contemporary fashions. 3 lectures.

**HE 440 Internship (1-12)**

Career experience with private or public agencies. Total credit limited to 12 units. Credit/No Credit grading. Prerequisite: Junior standing and permission of instructor.

**HE 442 Tailoring (2)**

Traditional and contemporary tailoring techniques as applied to garment construction and selection. 2 laboratories. Prerequisite: HE 241, 322, or consent of instructor.

**HE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision, the project to be related to a probable field of employment. Results of the study are presented in a formal report. Minimum of 120 hours to be used in making the study. Prerequisite: Engl 114, Engl 218 or 300, Senior standing in the major.

**HE 463 Undergraduate Seminar (2)**

Discussion of individual capabilities, values, academic preparation as they relate to the career process; implications of current social issues for the profession. Recommended enrollment three quarters prior to graduation. 2 lectures. Credit-No Credit grading only. Prerequisite: senior standing in major.

**HE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**HE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topics selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

**HE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of the department head, the graduate program coordinator, and the supervising faculty member.

**HE 501 Seminar in Family Management (3)**

Principles, major problems and trends affecting the economic decisions of the family. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**HE 511 Research Design (3)**

Methods of research and critical analysis of scientific literature and problems in home economics. 3 lectures. Prerequisite: Graduate standing.

**HE 525 Experimental Studies in Textiles (2-4)**

Review and reporting of pertinent studies in textile research. Testing of fabrics using equipment available. 1 lecture, 1 two-hour laboratory. Total credit limited to 4 units. Prerequisite: Graduate standing and HE 422 or consent of instructor.

**HE 528 Experimental Studies in Foods (2-4)**

Experimental approach to the study of chemical and physical properties of interacting components of selected foods; correlated emphasis on selection, application, and evaluation of pertinent literature. 1 lecture, 1 two-hour laboratory. Total credit limited to 4 units. Prerequisite: Graduate standing or consent of instructor.

**HE 532 Problems and Trends in Interior Design (3)**

Current developments in design, materials, and coordination of home furnishings. Individual problems. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**HE 536 Experimental Studies in Household Equipment (3)**

Development of professional and consumer criteria to improve evaluation of household appliances. Current research and techniques for investigations with home equipment. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and HE 331 or consent of instructor.

**HE 580 Seminar (1-3)**

Advanced study of current issues and topics significant for professional home economists. Class schedule will list topics selected. 1-3 lectures. Maximum of 6 units may be earned. Prerequisite: Graduate standing.

**HE 582 Graduate Seminar in Nutrition (1)**

Critical review of literature on selected topics in the field of nutrition. Total credit limited to 3 units. Prerequisite: Graduate standing.

**HE 584 Seminar in Women's Roles (3)**

Redefinition of sex roles. Methods of solving family role conflicts as women enter the labor force and the political arena. 3 lectures. Prerequisite: Graduate standing.

**HE 585 Seminar in Clothing (3)**

Current trends in clothing design and construction. Advanced study of clothing related to human behavior. 3 lectures. Prerequisite: HE 341 and graduate standing.

**HE 587 Seminar in Family Housing (3)**

Current housing problems of minorities, the elderly, handicapped, and other groups of concern to professional home economists. 3 lectures. Prerequisite: Graduate standing.

**HE 599 Thesis (3) (3)**

Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing.

## **HUMANITIES**

**Hum 218 The Arts in Live Performance (4)**

Preparation for attendance at a variety of live performances in the arts, followed by group critique sessions and individual written reports. 1 lecture, 3 activities.

**Hum 270 Contemporary Ideas (3)**

Interdisciplinary study of human values as they relate to one or more areas of these disciplines: history, literature, philosophy, and the arts. 3 lectures. Prerequisite: Phil 101 or consent of the instructor.

**Hum 320 Future Studies (3)**

Evaluation of methods used in forecasting future trends. Critical examination of the predictions made by futurists and their implications for humankind. 3 lectures. Prerequisite: Junior or senior standing and Engl 105.

**Hum 340 Creative Ideation (3)**

The process of forming ideas or images. Application of the findings to various disciplines and occupational fields. Assessment of the implications for the individual and society. 3 lectures. Prerequisite: Junior standing and Psy 202.

**Hum 350 Esthetics (3)**

Interdisciplinary investigation of artistic phenomena and esthetic experience which may emphasize psychology, philosophy, history, arts, or literature. 3 lectures. Prerequisite: Phil 101.

**Hum 400 Independent Travel Project (1-2)**

Independent preparation of a travel study project related to the student's academic studies. Bibliography and plan for investigation submitted in advance. Project evaluated after travels. 1-2 activities. Prerequisite: Senior standing or consent of instructor.

**Hum 402 Human Values (3)**

Humanistic and social science learning concerning human values. 3 lectures. Prerequisite: Senior standing.

**Hum 461 Senior Project (3)**

Selection and completion of a project under faculty supervision. Results presented in a formal report. Minimum of 120 hours time.

# INDUSTRIAL ENGINEERING

## IE 101 Introduction to Industrial Engineering (3)

Historical development of the industrial economy and the profession of industrial engineering. Basic concepts and principles of industrial organization and management. The dynamics of industrial engineering in the field of systems, production, and data processing. Review of career opportunities. 3 lectures.

## IE 123 Industrial Systems Analysis (4)

Systems, subsystems, and relationships (interfaces) of industrial systems concepts in modern productive society. Trends in techniques for data gathering, analysis, and presentation for management decisions. 3 lectures, 1 laboratory.

## IE 141 Manufacturing Processes (1)

Metal casting as a process in manufacturing. Properties of molding materials and methods of casting. Sand, shell molding, investment molding and casting, core making, and sand testing. Pattern and casting design principles. 1 laboratory.

## IE 142 Manufacturing Processes II (2)

Laboratory work similar to IE 141. Expanded theory, principles, advantages, and limitations of casting process. 1 lecture, 1 laboratory.

## IE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

## IE 201 Production Costs Estimating (3)

Estimating the costs of a finished product from encompassing product materials, processing and assembly, labor, depreciation, general and administrative overhead costs. Compilation into a final cost. Break-even analysis, learning curves and network-cost analysis are introduced. Volume vs. price and quality. 3 lectures. Prerequisite: Sophomore standing.

## IE 214 Production Control (2)

Coordination of production facilities to meet objectives of customer service, minimum inventory investment, and maximum manufacturing efficiency. Forecasting, statistical determination of order requirements, group technology concepts, input-scheduling and machine loading control techniques. 2 lectures. Prerequisite: Sophomore standing.

## IE 222 Engineering Analysis (3)

Methods of evaluating variability of engineering design parameters, predicting deviations from expected averages, counting, grouping data for computations. Computation techniques. Expected fit within engineering tolerances and allowable signal fluctuations. 2 lectures, 1 activity. Prerequisite: Math 131.

## IE 223 Man-Machine Systems (4)

Principles of work simplification, methods flow charting and micro-motion analysis. Quantitative analysis of work measurement methods including time study, synthetic data and work sampling. Review of allowances and performance ratings. Integration of these techniques in man-machine systems. 3 lectures. 1 laboratory. Prerequisite: IE 123, Math 142.

## IE 239 Industrial Costs and Controls (4)

The estimating of manufacturing costs based on forecasts for production planning, cost analysis, and cost control. Budgeting costs and analysis of cost variances as principal keys to cost control, inventory valuation, and pricing. Techniques of forecasting, cost estimating, and cost reduction. 3 lectures, 1 laboratory. Prerequisite: IE 123.

## IE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

**IE 251 Manufacturing Engineering Laboratory (4)**

Properties of materials including relative cost selection for industrial use. Experimental studies in properties and behavior of metals, heat treatment, powder metallurgy, EDM, and metrology. Instrumented analysis of cutting tool forces and machine tool alignment with laser interferometry. 2 lectures, 2 laboratories. Prerequisite: Chem 124.

**IE 301 Patterns in Problem Solving (3)**

Characteristics of patterns, problem solving, the common features of solutions of societal, industrial, and governmental problems. Unique results by reverse application of nonmathematical but quantitative application, results anticipated vs. results obtained. 3 lectures.

**IE 304 Operations Research (3)**

Introductory matrix theory. Linear programming: graphical and simplex method, sensitivity analysis, transportation, and assignment algorithm. Probability and queuing theory. Existing computer programming algorithms applied. 3 lectures. Prerequisite: Stat 321.

**IE 305 Energy Conservation (3)**

The critical nature and importance of energy conservation. Motivation toward and the use of the techniques of conservation in the home and consumption devices of everyday life. Calculations of energy costs to the individual. 3 lectures.

**IE 312 Data Analysis (3)**

Applying basic filing systems, tab card systems and computers to data collection and analysis. The planning, design, and use of auxiliary files for electronic data processing. Survey of pertinent computer languages. Establishment of data bases required for manufacturing and work control systems. 2 lectures, 1 laboratory. Prerequisite: Engr 251.

**IE 319 Human Factors Engineering I (3)**

Research into factors influencing the efficiency of human work. Data on the physical and mental capacities of persons, the physical environment, work organization, and the problem of aging. Human reactions and capabilities related to specific tasks and systems. Design of machines, operations, and work environment to match human capacities and limitations. 3 lectures. Prerequisite: Psy 202 and junior standing.

**IE 343 Facilities Design (4)**

Utilization of manufacturing data in the design of production processes and planning industrial facilities. Quantitative analysis of integrated plant arrangement. Product flow, production line balancing, material handling, warehousing. Computerized methods. Systems approach to optimum facilities design. 2 lectures, 2 laboratories. Prerequisite: IE 251, 223 and Junior standing in engineering.

**IE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limit to 4 units, with a maximum of 2 units per quarter.

**IE 401 Sales Engineering (2)**

Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 lectures. Prerequisite: Senior standing in Engineering, or consent of instructor.

**IE 403 Principles of Engineering Economics (3)**

Development of methods to assess the time-value of money through mathematical models. Evaluating economic factors in the making of individual or industrial decisions. Effects of depreciation and income taxes on the analysis. 3 lectures. Prerequisite: Senior standing in other than engineering.

**IE 405 Operations Research II (3)**

Introductory study of network analysis, dynamic programming, game theory and inventory theory. Computer programming in solution of problems. 3 lectures. Prerequisite: IE 304, Stat 321.

**IE 406 Computer Aided Production (3)**

Computer aids in manufacturing using digital computers and microprocessors. Nontraditional manufacturing techniques and processes. 2 lectures, 1 laboratory. Prerequisite: IE 251, Engr 251, Math 143, or consent of instructor.

**IE 407 Algorithmic Systems Analysis (3)**

Advanced linear programming as applied to problems in industrial systems. Integer programming using branch-and-bound. Nonlinear programming. Quadratic programming. Dynamic programming concepts. 3 lectures. Prerequisite: Math 242, Stat 321, IE 405.

**IE 408 Production Systems Analysis (3)**

Forecasting, job scheduling and sequencing, stochastic inventory, and related methodology for operation, design, and control of productive systems. Case studies from current journals. 2 lectures, 1 laboratory. Prerequisite: IE 405.

**IE 409 Information Systems Optimization (3)**

Economic evaluation of information for sequential decision process; Bayes theory and models. Decision theory and value information applied to production control. Cybernetics, information theory introduced. 3 lectures. Prerequisite: IE 407.

**IE 414 Engineering Economy Economics (3)**

Economic analysis of engineering decisions. Determining rates of return on investments. Effects of inflation, depreciation and income taxes. Application of basic principles and tools of analysis using case studies. 3 lectures. Prerequisite: Math 242, senior standing or consent of instructor.

**IE 415 Engineering Economy (2)**

Engineering economic analysis of engineering decisions. Selection and use of interest rate factors, methods of analysis, depreciation and taxes as applied to cases in the field of engineering. 2 lectures. Prerequisite: Math 143, junior standing.

**IE 420 Industrial Systems (3)**

Application of general systems theory to industrial systems. Techniques of building simulation models that represent real industrial situations. Use of parametric runs to evaluate the sensitivity of system parameters. 2 lectures, 1 laboratory. Prerequisite: Stat 321, Engr 251, IE 304.

**IE 430 Statistical Quality Control (3)**

Statistical theory of sampling to analyze output variation. Managerial methods to control attributes of incoming or in-process material. Quantitative risk factors for decisions based on sampling procedures with associated operating characteristics and control charts. Case studies and experiments. 2 lectures, 1 laboratory. Prerequisite: Stat 321.

**IE 441, 442 Fundamentals of Supervision (2) (1)**

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 2 laboratories, 1 laboratory. Prerequisite: IE 233.

**IE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours of total time.

**IE 463 Undergraduate Seminar (2)**

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments and/or subject matter pertinent to industrial engineering. 2 lectures. Prerequisite: Senior standing in IE.

**IE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**IE 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One or three laboratories. Prerequisite: Consent of instructor.

**IE 541 Advanced Operations Research (3)**

Models for mathematical programming and operations research. Mathematical programming topics in linear programming, network analysis, and dynamic programming. Operations research models will include queuing, inventory models, simulation, and Monte Carlo. Special analysis problems in non-linear programming and integer programming. 3 lectures. Prerequisite: IE 333, CSc 219, Stat 322, or consent of instructor.

**IE 542 Reliability Engineering (3)**

Theory and techniques for determining the reliability of systems and system elements. Influence of failures in series, parallel, and redundant designs. Failure modes and effects. Frequency distributions of failures and failure rates. Methods of estimating, predicting, measuring, and testing for reliability and effectiveness. 3 lectures. Prerequisite: IE 430, Stat 322, 425; or consent of instructor.

**IE 543 Advanced Human Factors (3)**

Theory and application of man-machine relations and system design. Concepts of mathematical models, human information input channels, decision making based on capability of human operator. 2 lectures, 1 laboratory. Prerequisite: IE 319 or equivalent and a course in biology.

## **INDUSTRIAL TECHNOLOGY**

**IT 101 Technical Computation (2)**

A study of the techniques used in the analysis and solution of typical technical problems. Emphasis on the need for orderly work, checking procedures, handling and presenting scientific data; purpose and presentation of technical reports. 2 lectures.

**IT 111 Industrial Education Careers (1)**

Survey of career opportunities in Industrial Arts and trade-technical teaching at the secondary school and community college levels. Job entry requirements. Technical and professional preparation. Credential requirements. 1 lecture.

**IT 112 Industrial Technology Careers (1)**

Survey of career opportunities in Industrial Technology. Job entry requirements and employment procedures. Technical and professional preparation. 1 lecture.

**IT 125 Industrial Wood Processes (3)**

Analysis of basic woodworking equipment, processes and materials currently used in lumbering, mill-cabinet, general construction and related industries. Theory and practice in the use of woodworking equipment. 2 lectures, 1 laboratory.



**IT 130 Automotive Fundamentals (2)**

Principles of operation and familiarity with basic components of the automobile from the consumer viewpoint. Economics of selection, operation, and preventive maintenance. Practical experience, owner inspection, maintenance and repair for beginners. Understanding of pollution control systems. 1 lecture, 1 laboratory.

**IT 135 Motorcycle Fundamentals (2)**

Principles of operation and familiarity with basic components of the motorcycle from the consumer viewpoint. Economics of selection, safety, operation and preventive maintenance. Practical experience, owner maintenance and repair for beginners. 1 lecture, 1 activity.

**IT 141 Plastics Processes and Applications (1)**

Uses, capabilities, and operational characteristics of plastics machinery and process fabrication equipment. Properties and classes of molds, tools. Plastics processes and applications. Introduction to injection molding, extrusion, compression molding, rotational molding, foaming, and plastic fabrication techniques. 1 laboratory.

**IT 222 Power Technology: Sources (4)**

Analysis of power sources: natural, steam, internal combustion, continuous combustion, nuclear energy, fuel cells, photo cells, thermal electricity. Transmission of power; clutches, gear trains, wrapped connectors, hydraulics, pneumatics, universal joints, bearings, lubricants. 2 lectures, 2 activities. Prerequisite: Phys 122.

**IT 233 Metal Technology (3)**

Theory and practice in care and use of hand and machine tools. Applications of welding, forging, foundry, sheet metal, ornamental metal, machine shop and bench metal processes to the fabrication of metal products. 3 activities.

**IT 237, 238 Industrial Electricity (3) (3)**

Theory and application of basic a.c. and d.c. circuits as they pertain to industry and teaching applications. Magnetic circuits. Principles of motors and generators, instruments, control and control circuits, transformers and circuitry, oscilloscopes. 2 lectures, 1 laboratory.

**IT 245 Technical Sketching (2)**

Freehand sketching of industrial products using perspective, isometric oblique and orthographic projection. Shading. Basic design. 2 activities.

**IT 250 Automotive Power (4)**

Theory and operation of automotive and other transportation power sources: Four cycle, two cycle, rotary, diesel and turbine internal combustion engines. Application and service of basic fuel, electrical, lubrication and cooling systems. 2 lectures, 2 activities.

**IT 304 Product Quality Control (3)**

Applications at the supervisory level of the overall quality plan for manufacturing. Quality assurance, testing, shop and field inspection techniques, material review, source inspection, vendor surveillance, and quality audit. 3 lectures.

**IT 311 Plant Safety Fundamentals (3)**

Fundamentals of safety management, background liabilities and safety legislation, hazards and their control in industry and industrial education: falls, falling objects, impacts, mechanical injuries, pressure, electrical, fires, explosions, toxic materials, radiation, vibration, noise. 2 lectures, 1 activity. Prerequisite: Junior standing.

**IT 324 Modern Industrial Finishes (2)**

Characteristics and applications of finishes to modern industrial products. Brushing, dipping, spraying, baking, plating, etching. 2 laboratories.

**IT 326 Product Evaluation (2)**

Procedures in the gathering, preliminary analysis and practical application of quality and reliability field data by industrial sales and service personnel. Principles of value engineering and production quality control techniques in relation to customer needs. 2 activities. Prerequisite: Junior standing.

**IT 327 Plastics Technology (2)**

Materials, processes and applications of industrial polymers. Basic operations in processing, fabricating and finishing of thermal plastic and thermal setting resins. 1 lecture, 1 activity. Prerequisite: IT 125, Chem 122

**IT 331 Industrial Electrical Systems (4)**

Industrial applications of electrical concepts in distribution systems, industrial wiring, illumination, motors and controllers. Field trips, 3 lectures, 1 laboratory. Prerequisite: IT 237, Math 131

**IT 332 Electronic Control Systems (4)**

Automated control devices from an operational and servicing viewpoint. Modular approach to the study of electronic control systems. Field trips. 3 lectures, 1 laboratory. Prerequisite: Phys 122, IT 237

**IT 333 Electronic Computer Applications (3)**

Fundamentals of analog computers, electronic data processing machines, and numerical control of machine tools. Applications in production supervision, sales, and industrial education, fundamentals of logic and logic circuits, simulation. 2 lectures, 1 laboratory. Prerequisite: IT 237, or consent of instructor.

**IT 336 Automotive Technology, Engines (3)**

Engine overhaul and maintenance, theory and construction. Practical activities with various types of engines, including automotive, marine, and low horsepower power plants. 1 lecture, 2 laboratory. Prerequisite: IT 250.

**IT 337 Advanced Plastics Processes (3)**

Primary plastic processing techniques; principles. Operation of extrusion, thermoforming, rotational molding, injection molding, compression molding, and blow molding equipment. Product diagnosis. 1 lecture, 2 activities. Prerequisite: IT 327.

**IT 339 Automotive Technology, Fuel Systems (3)**

Fuel systems and fuels used in internal combustion engines. Carburetors, injectors, superchargers, manifolds, pumps, and storage tanks. Emission control systems. Types of fuels and their compounding. 2 lectures, 1 laboratory. Prerequisite: IT 250.

**IT 346 Industrial Design (2)**

Applications of design principles to the various materials and processes of industry; development of a creative, problem-solving approach to design as it applies to industry. 2 activities. Prerequisite: IT 125, 245, and a minimum of 4 units of manufacturing processes courses.

**IT 350 Quality Systems Applications (3)**

Philosophy and principles of quality system administration. Relationship to total systems program administration; impact on management information and data requirements. Quality system administration techniques applied to control performance, cost and schedule data, traceability, and retrievability. 3 lectures. Prerequisite: Math 120, Junior standing.

**IT 352 Additional Laboratory Problems (1-2)**

Advanced instruction in the construction, repair, maintenance, and use of laboratory equipment. Primarily for students intending to become industrial education teachers. Total credit limited to 4 units with not more than 2 units any one quarter. 1 or 2 laboratories. Prerequisite: Consent of instructor.

**IT 353, 354, 355 Wood Technology (3) (3) (3)**

Application of design principles, materials and construction techniques, furniture manufacturing, machine tool maintenance and mill cabinet work. Materials and methods used in modern industry. 3 activities. Prerequisite: IT 125.

**IT 356 Building Construction Techniques (3)**

Examination of modern materials and construction methods as applied to home building; mass-production, custom-building and prefabrication. Field study of representative projects; laboratory experience in framing and basic processes. 3 laboratories. Prerequisite: IT 353.

**IT 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**IT 404 Customer Relations (2)**

Customer contacts; personal relationships, ethics, legal relationships, service contracts, communication channels. 2 lectures. Prerequisite: Mktg 204. Senior standing or consent of instructor.

**IT 405 Industrial Marketing (2)**

Investigation of the institutions and channels involved in industrial marketing. Analysis of industrial products, competitors, and consumers. Problems in marketing research, personnel, and management. Individual reports on industrial products, companies or training programs. 2 lectures. Prerequisite: Mktg 204 or 301. Senior standing or consent of instructor.

**IT 406 Cost Reduction and Control (3)**

Application of cost control procedures at the foreman level. Techniques of cost reduction. Goals in reducing waste of material and defects in workmanship. 3 lectures. Prerequisite: Senior standing.

**IT 407 Industrial Product Development (3)**

Organization for new industrial product development, linking marketing, operations and technology functions; sources and screening of new product ideas, sizing and evaluation of market prospects, budgeting, pricing, timing, advertising and distribution factors as they relate to new industrial products, internal coordination during product development phases. 3 lectures. Prerequisite: IT 404, 405 or consent of instructor.

**IT 408 Industrial Packaging (3)**

Principles of industrial packaging development. Packaging of different classes of products. Materials, standards, quality control, economics. Analysis of package configurations, closing features, locking devices and cushioning for military and industry. Material handling considerations, liability implications, recycling factors. 2 lectures, 1 activity. Prerequisite: GrC 330 or senior standing or approval of instructor.

**IT 409 Packaging Machinery (3)**

Analysis of major types of packaging machinery from a practical, operational and marketing viewpoint. Basic processes utilizing packaging machinery. Specialized operations, contract specifications, selection, operation and maintenance. Required field trips to packaging operations. 2 lectures, 1 activity. Prerequisite: IT 408 or approval of instructor.

**IT 410 Drafting: Industrial Education (3)**

Teaching applications of drafting principles, home planning, sketching, rendering and industrial working drawings. For high school industrial arts drafting teachers. Field trips to industrial drafting offices. 1 lecture, 2 activities. Prerequisite: IT 444 or consent of instructor.

**IT 413 Plant Maintenance Management (3)**

Maintenance and repair of plant facilities, operation of utility plants and systems and furnishing of utilities services, preventive maintenance, job control systems, and other essential services. 3 lectures. Prerequisite: Senior standing.

**IT 415, 416, 417 Industrial Equipment Selection (3) (3) (3)**

Electrical and mechanical equipment making up the utility and production support systems of a modern industrial plant. Technical alternatives available in terms of economic choice for project profitability, capital budgeting in terms of industrial equipment planning. Forecasting of depreciation due to unusual wear, use, and technological obsolescence. 3 lectures. Prerequisite: IT 331, 432, Econ 212.

**IT 418 Technical Management Problems (4)**

Organization and positions of key personnel in corporate technical management structure; their functions, duties and interfaces with operations, marketing, general management and research/development. Structure and objectives related specifications and proposals with case studies. 3 lectures, 1 activity. Prerequisite: Senior standing, Mgt 311, or consent of instructor.

**IT 419 Industrial Internship (2-6)**

Part-time industrial experience, with or without pay. Conducted under company and faculty supervision. Guided observations related to technical management. Report of experiences is required at end of quarter. Credit, no credit grading. Prerequisite: Any of the following: IT 326, 331, 332, 333, 346, 404, 405, 407, 413, 433.

**IT 422, 423 Construction Equipment (2) (2)**

Analysis of major types of construction equipment from a practical marketing viewpoint. Contract specifications, estimating, basic processes utilizing construction equipment, selection of appropriate equipment and equipment operation and maintenance. Field trips. 1 lecture, 1 laboratory. Prerequisite: IT 222, 237.

**IT 424 Curriculum and Methods of Industrial Education (3)**

Industrial education curriculum and instructional processes. Organization, selection, presentation, application, interpretation and evaluation for teaching automotives, drafting, electronics, graphic arts, industrial crafts, metals, photography, plastics, power mechanics, woodworking. Preparation for student teaching. Field trips. 2 lectures, 1 activity. Prerequisite: Ed 301, 335.

**IT 425 Automotive Technology, Engine Heads (3)**

Theory and operation of automotive cylinder heads, valve train for both spark ignition and diesel engines. Maintenance including testing, machine processes, rebuilding procedures and adjustments. 1 lecture, 2 activities. Prerequisite: IT 336.

**IT 426 Automotive Technology, Chassis (3)**

Fundamental, technical, and teaching aspects of automotive suspension system, steering, braking, and other control systems. Tires and lubrication. 1 lecture, 2 activities. Prerequisite: IT 250.

**IT 427 Automotive Technology, Electronics (3)**

Applications of electronics and electrical systems in automotive type equipment including ignition, lighting, starting, charging, auxiliary systems, and control systems. 2 lectures, 1 laboratory. Prerequisite: IT 250.

**IT 428 Automotive Technology, Power Trains (3)**

Advanced applications of clutches, gears, standard and automatic transmissions, drive lines, differentials and axles, lubrication and bearings. 1 lecture, 2 laboratories. Prerequisite: IT 250.

**IT 431, 432 Mechanical Systems (3) (3)**

Applications of basic physics to mechanical systems using the English system of units; various component systems. Steam systems, air conditioning and refrigeration systems, pneumatic and hydraulic systems, piping systems. 2 lectures, 1 activity. Prerequisite: Math 131, Phys 122, IT 222.

**IT 433 Mechanical Systems (3)**

Production equipment and systems, metals, measurement, tooling and finishes. Mass production. Production management. 2 lectures, 1 activity. Prerequisite: Junior standing.

**IT 434 Industrial Packaging: Systems (3)**

Technical interrelationships of industrial packaging: design, materials, quality control, packaging and product manufacturing, labeling, handling, storage, transportation and marketing. 2 lectures, 1 activity. Prerequisite: IT 408 or GrC 330 or senior standing.

**IT 435 Industrial Packaging: Operations (3)**

Technical management decisionmaking regarding packaging functions, costs, and applications trade-offs. Government regulations, economics and producer-user interface. Case studies involving critical, technical, manufacturing and marketing packaging factors dealing with materials, such as plastic, metal and wood that have extensive industry applications. 3 lectures. Prerequisite to consist of one of the following: IT 326, 408, GrC 330, or senior standing.

**IT 437 Reinforced Plastics (3)**

Mold preparation and production of reinforced plastic products. Standard specifications for reinforced materials and resin systems. 1 lecture, 2 laboratories. Prerequisite: IT 327.

**IT 438 Plastics Mold Construction (3)**

Properties and characteristics of thermosetting and thermoplastic materials. Analysis and construction of molds and dies for use with reinforced plastics, injection molding, thermoforming processes; extrusion, and compressions and transfer molding. Selection of plastics. 1 lecture, 2 activities. Prerequisite: IT 327.

**IT 439 Plastics Process Control (3)**

Plastic processing behavior. Methods for measuring machine and plastic pressures, temperatures, and flow rates. Instrumentation for process analysis, control, and evaluation of molded part characteristics. Effects of molding variables on part quality. 1 lecture, 2 laboratories. Prerequisite: IT 438. Recommended: Chem 122.

**IT 441 Metal Production Processes (4)**

Study of mass-production techniques; design, production planning, tolerances, jigs and fixtures, interchangeable parts, assembly line. Design and construction of projects suitable for industrial arts metal courses. 1 lecture, 3 activities. Prerequisite: IT 233, 443 or consent of instructor.

**IT 443 General Metals (3)**

Applications of the various general metal fabrication processes to typical construction problems. Design and construction of instructional projects suitable for the secondary school industrial education program. Maintenance of metalworking equipment. 1 lecture, 2 activities. Prerequisite: IT 233 or consent of instructor.

**IT 444 Technical Drawing: Industrial Education (4)**

Application of current drafting procedures in preparing complete graphic descriptions of industrial components. Sketching, lettering, instrument drawing. Preparation of work drawings and specifications. Analysis of drafting materials, equipment and processes. 1 lecture, 3 activities. Prerequisite: IT 245, or consent of instructor.

**IT 446 Wood Production Processes (2)**

Study of mass-production techniques; design, production planning, jigs and fixtures, interchangeable parts, assembly line. Design and construction of projects suitable for industrial arts wood courses. 2 laboratories. Prerequisite: IT 353, 433.

**IT 451 Electronics: Industrial Education (4)**

Teaching applications of the principles and operation of non-linear devices such as vacuum tubes, semi-conductors and associated solid state components. Programs and experiments for the teaching of electronics at the secondary level. 3 lectures, 1 laboratory.

**IT 453 Electronics: Industrial Education (3)**

Planning, equipping and organizing a high school electricity-electronics industrial arts program. Course objectives and methods of teaching electricity and electronics at the high school level. Field trips to local high schools will be arranged. FCC regulations. 3 lectures. Prerequisite: IT 451.

**IT 459 Industrial Education Seminar (2)**

Preparation for individual applied research in industrial education. Philosophy, professional organizations, instructional aids, evaluation and introduction to graduate study in industrial education. 2 lectures. Prerequisite: IT 424 or consent of instructor.

**IT 460 Industrial Technology Seminar (2)**

Preparation for senior project. Oral presentation and discussion by students of papers on related professional topics. 2 lectures.

**IT 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects are typical of problems graduates must solve in their field of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: IT 459 for Industrial Arts majors and IT 460 for Industrial Technology majors.

**IT 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**IT 471 Selected Advanced Activity (1-3)**

Directed group study for advanced undergraduate and graduate students. Class schedule will list topic selected. May be required with IT 470. Total credit limited to 6 units. 1 to 3 activities. Prerequisite: Consent of instructor.

**IT 500 Individual Study (1-5)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**IT 515 History and Philosophy of Industrial Education (3)**

Development of industrial education from its initial conception to the present time. Current philosophical concepts of the field. 3 lectures. Prerequisite: Graduate standing.

**IT 520 Organization and Administration of Industrial Education (3)**

Case studies of current problems in the administration and organization of industrial arts and industrial-technical education. Problems in industry, financing industrial education, work-experience and adult education programs, and community education. 3 lectures. Prerequisite: Student teaching or consent of instructor.

**IT 521 Curriculum in Industrial Education (3)**

Basic principles and practices in the preparation of course guides, courses of instruction and related materials for industrial instruction. 3 lectures. Prerequisite: Student teaching or teaching experience in public schools or industry, or instructor approval.

**IT 522 Facility Planning in Industrial Education (2)**

Analysis of major factors in planning and designing industrial education laboratories and related areas. Includes State standards, equipment specifications, and presentation displays. 2 activities. Prerequisite: Student teaching or instructor approval.

**IT 527 Trends and Issues in Industrial Education (3)**

Guided study and discussions of current and innovative practices in industrial education. Identification of major issues facing the industrial educator. Development of a personal philosophy of industrial education. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**IT 580 Graduate Seminar in Industrial Education (3)**

Advanced study and analysis of selected topics and problems in industrial education. 3 meetings. Prerequisite: Instructor's approval.

**IT 599 Industrial Education Thesis or Project (5)**

Each student will propose, develop and complete a thesis or project involving individual research that is significant to the field of industrial education. Prerequisite: Acceptable academic standing in the master's program in Industrial Arts and consent of the instructor.

## **JOURNALISM**

**Jour 118 Journalism in Society (3)**

Examination of the mass media, their methods, purposes, and functions. Responsibilities of Journalists; importance of media in society, 3 lectures.

**Jour 201 Journalism History (3)**

Survey of historical influences in the development of today's journalism. 3 lectures.

**Jour 203 Reporting I (3)**

Techniques of news reporting and writing. Intensive practice in gathering and evaluating information and writing basic news stories. 2 lectures, 1 two-hour laboratory. Prerequisite: Engl 114, and typing proficiency.

**Jour 231 Advertising (3)**

Principles of advertising, advertising psychology, salesmanship, copy layout, and production for print and broadcast media. 3 lectures.

**Jour 233 Copy Editing (3)**

Copy desk work: rewriting, editing, and headlining news copy. Selecting, cropping, and captioning news photos. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 203.

**Jour 302 Law for Journalists (3)**

State and federal laws affecting journalists. Hazards of libel and what defenses are recognized; contempt of court, right of privacy; study of postal regulations, regulations in advertising, broadcasting, photography, and business regulatory statutes; ethics and responsibility of the press and broadcast media. 3 lectures.

**Jour 304 Reporting II (3)**

Experience in advanced reporting and news writing with special attention to public affairs. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 203.

**Jour 312 Public Relations (3)**

Principles of public relations and public opinion; methods employed in dissemination of public information by various organizations. 3 lectures.

**Jour 323 Photojournalism (3)**

Theory of photojournalism. The photograph as a visual statement of fact. Value of the photograph in communication of news in newspapers and magazines. Photographic news assignments. Techniques in developing news picture essays. 2 lectures, 1 laboratory. Prerequisite: Jour 203, Art 224.

**Jour 326 Broadcast Announcing (3)**

Radio and television announcing of news, sports, special events, commentary, features, commercials, and talk and discussion. 1 lecture, 2 laboratories. Prerequisite: Sp 200.

**Jour 333 Broadcast News I (3)**

Radio news course with emphasis on live and taped interviews, newscast production and presentation, reporting, and broadcast newswriting style. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 203.

**Jour 351 Journalism Practice (2)**

Credit arranged by sections as indicated by subtitle for students holding editorial, advertising, or photographic positions on such departmental publications as Mustang Daily, or radio station KCPR, closed circuit television, or other similar supervised experience. 2 laboratories. Total credit limited to 6 units. Prerequisite: Instructor's permission.

**Jour 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

**Jour 401 International Press (3)**

Global communications facilities and operations; world transmission of information; survey of world wire services and international print and broadcast news media. Analysis of press operations under varying government ideologies. 3 lectures. Prerequisite: Junior standing.

**Jour 406 Magazine Writing (3)**

Feature writing techniques. Study of markets for nonfiction articles; practice in research and preparation of articles. 3 lectures. Prerequisite: Jour 203 or consent of instructor.

**Jour 413 Advanced Public Relations (3)**

Methods employed in dissemination of public information by organizations. Survey of media, case histories, formation and measurement of public opinion. 3 lectures. Prerequisite: Jour 312.

**Jour 425 Advertising Layout and Copywriting (2)**

Study of advertising typography and illustration, application of production processes in making of layouts and writing of copy. 1 lecture, 1 two-hour laboratory.

**Jour 432 Broadcast News II (3)**

Video tape and filmed television news interviews, reports, and features. Television continuity and newswriting. Production of television public affairs broadcasts. 2 lectures, 1 laboratory. Prerequisite: Jour 333.

**Jour 434 Advanced Editing (3)**

Daily experience and responsibilities in editing and rewriting news and feature stories. Practical application of headline writing and page makeup principles. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 233, 304.

**Jour 444 Media Internship (4)**

Application of techniques on daily basis with media under supervision of department faculty. Prerequisite: Junior standing in Journalism.

**Jour 460 Senior Project (3)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

**Jour 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.



## LANDSCAPE ARCHITECTURE

### LA 201 Introduction to Landscape Architecture (2)

Survey of the profession of landscape architecture from small space design to regional planning. Relationships between landscape architects and society and professionals in related fields. 2 lectures. Prerequisite: Landscape Architecture major or consent of instructor.

### LA 231 Landscape Architecture Practice (3)

Introduction to basic principles and methods of landscape architectural construction drawings. 3 laboratories. Prerequisite: Arch 106, ArcE 311 or consent of instructor.

### LA 240 Additional Landscape Architecture Laboratory (1-2)

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

### LA 301 Landscape Architectural Theory (3)

Landscape architecture and the concepts and physical planning of selected periods in history. Evaluation of spatial and ecological organization of man-made environments. 3 lectures. Prerequisite: LA 201 or consent of instructor.

### LA 317 History of Landscape Architecture (3)

Historical evaluation of man's interaction with outdoor space. Analysis of influences that direct, perpetuate, and form the landscape. 3 lectures. Prerequisite: Engl 104.

### LA 341, 342, 343 Landscape Practice (2) (2) (2)

Theory and application of working drawings, specification, cost estimation, codes, regulations, and contractual agreements. Landscape architecture practice as a profession. 2 laboratories. Prerequisite: LA 231. Concurrent: LA 351, 352, 353.

### LA 347 Landscape Plant Composition (3)

Plant characteristics and ecological conditions as constraints and opportunities for the landscape architect. Selection of plant materials for design effect. 1 lecture, 2 laboratories. Prerequisite: EDes 203, Bot 238, OH 239.

### LA 351, 352, 353 Design for Landscape Architects (5) (5) (5)

Development of creative abilities for solving landscape problems. Emphasis on logical analysis and application of design skills. 5 laboratories. Prerequisite: EDes 110, 203. Concurrent: LA 341, 342, 343.

### LA 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### LA 441 Professional Practice (3)

Office organization, contract documents and specifications. Ethics, problems and practices in the profession of landscape architecture. 3 seminars. Prerequisite: LA 343.

### LA 451, 452, 453 Design for Landscape Architects (5) (5) (5)

Continuation of LA 353 emphasizing individual initiative and responsibility in solving problems of increased complexity. 5 laboratories. Prerequisite: LA 343, 353, AE 337.

### LA 461, 462 Senior Project (2) (2)

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. To be completed in two consecutive quarters. 120 hours minimum total time. Prerequisite: LA 343, 353.

### LA 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

#### **LA 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

### **LIBRARY**

#### **Lib 101 Library Instruction (1)**

Instruction and practice in the use of the card catalog, reference books, periodical indexes, government documents, and other library materials. Development of student independence and initiative in using the library as a source of information. 1 lecture.

#### **Lib 301 Library Resources and Literature Searches (1)**

Sources of information in major subject fields. Reference materials, bibliographic aids, indexing and abstracting tools, periodicals, serials, and other sources. Techniques used in literature searches and preparation of bibliographies. Class schedule will list major subject area covered. Total credit limited to 3 units. 1 lecture. Prerequisite: Junior, senior or graduate standing or consent of instructor.

### **MANAGEMENT**

#### **Mgt 118 Introduction to Human Relations in Business (3)**

Small group dynamics, leadership, communication, motivation, and perception. The individual in the business organization. For nonbusiness majors. 3 lectures.

#### **Mgt 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

#### **Mgt 201 Principles of Management (3)**

The management process involving organization, decision-making, and managerial activities fundamental to all management levels and functional areas. Application to business firms, governmental agencies, hospitals, benevolent groups, and colleges. 3 lectures. For nonbusiness majors.

#### **Mgt 206 Principles of Purchasing (3)**

The purchasing function applied to manufacturing, retailing, and food-service institutions. The purchasing function and its interdependence with other functional areas of the organization. 3 lectures. For nonbusiness majors.

#### **Mgt 302 International Business Management (4)**

Organization and operation of foreign business and multinational firms. Case studies dealing with differing cultural backgrounds, national interests, and economic pressures. 4 lectures. Prerequisite: Mgt 312 and junior standing.

#### **Mgt 310 The Labor Movement in the United States (4)**

Labor movement theories, American trade-union development, union management, labor and economic political power, variations in labor movements. Union issues in private and public sectors. 4 lectures.

#### **Mgt 311 Industrial Management (4)**

Organization and functioning of management in industry. Planning, direction, and control of the business enterprise in terms of policy formation, organizational structure, finance, sales, procurement, plant location, facilities and production processes. 4 lectures. Prerequisite: Junior standing.

**Mgt 312 Organization and Management Theory (4)**

An examination of the structural and configurational components of formal organizations. Analysis of management theory development, concepts of organizational processes and managerial strategies. Application of organizational and management imperatives to formal organizational structures and functions. 4 lectures. Prerequisite: Junior standing.

**Mgt 313 Industrial Relations (3)**

The functions of personnel and labor relations as they relate to the management of the human resources in the organization. Industrial relations theory and practice. For nonbusiness majors only. 3 lectures.

**Mgt 314 Human Resources Management (4)**

The personnel function as it relates to the management of the human resources of the organization. A survey of employee/employer relations, the work environment, employee behavior and development and labor relations. 4 lectures. Prerequisite: Junior standing.

**Mgt 315 Advanced Personnel Management (4)**

Managerial functions related to the procurement, development, maintenance, and utilization of people in the work environment. 4 lectures. Prerequisites: Mgt 314, or consent of instructor.

**Mgt 316 Labor Contract Administration (4)**

Resolution of problems involving disputes between individuals, unions and companies. Simulation techniques designed to present material both orally and in writing in a creative, logical rational manner. 4 lectures. Prerequisite: Junior standing.

**Mgt 317 Organizational Behavior (4)**

Application of behavioral science concepts to management. Motivation perception, communications, leadership style, group dynamics. Effectiveness: individual, interpersonal, team, intergroup and organizations. 4 lectures. Prerequisite: Junior standing.

**Mgt 319 Wage and Salary Administration (4)**

Management of compensation systems. Job analysis-job descriptions-job evaluations, employee evaluation, wage and hour legislation, incentive systems, et. al., theory, rationale, and practice of compensation. 4 lectures. Prerequisite: Mgt 314 or consent of instructor.

**Mgt 321 Quantitative Business Analysis and Applications of Data Processing (4)**

Application of computer and quantitative techniques in business and industry. Data bases and management information systems. Allocation of resources models, game theory, simulation, network analysis, forecasting; relationship of the computer to the management decision-making process. 4 lectures. Prerequisite: Math 221, Stat 252.

**Mgt 322 The Management Information System (4)**

Characteristics of a Management Information System. Justification for an information system. Systems analysis and design. Determination of management requirements. Development and implementation of an information system. The management decisionmaking process and the Management Information System. The Data Base. Project analysis. 4 lectures. Prerequisite: Mgt 321 or consent of instructor.

**Mgt 323 Simulation of Management Decisionmaking (4)**

The simulation of business problems for management decisionmaking. The types of business simulators. Use of the computer in simulation. The interaction of the information system and the simulation concept. Business applications and solutions of cases. 4 lectures. Prerequisite: Mgt 321 or consent of instructor.

**Mgt 325 Production and Operations Management (4)**

Introduction to operations management and production systems; production models. Planning and control in manufacturing. Quantitative methods and statistical techniques used in production systems management. 4 lectures. Prerequisite: Mgt 312, Mgt 321 or concurrent enrollment.

**Mgt 331 Organization Design and Analysis (4)**

Organizational design strategies and constructs, environmental, technological, and behavioral imperatives influencing organizational objectives and structures; design modifications to accommodate industrial, governmental, and nonprofit organizational requirements. Diagnostic analysis approaches; causation analysis; alternative formulation and analysis; design optimization criteria and techniques. 4 lectures. Prerequisite: Mgt 312 or permission of the instructor.

**Mgt 341 Planning and Decision Theory (4)**

Development of a theory of planning. Process of planning, role of participants in planning, the auxiliary functions. Integration into a general theory of decision making, with behavioral and quantitative aspects. 4 lectures. Prerequisite: Mgt 312.

**Mgt 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

**Mgt 410 Employee Benefits (4)**

Employee benefit programs in the private sector. History, theory, rationale, and contents of benefits. Effects on payroll and other costs, contract negotiations, employee relations, pensions, hospitalization insurance, thrift plans, bonuses, profit sharing, worker's compensation, non-hospitalization insurance plans, et al. 4 lectures. Prerequisite: Mgt 314 or consent of instructor.

**Mgt 412 Contract Negotiation in Collective Bargaining (4)**

Collective bargaining and the relationship between management and labor leading to the development of a contract. 4 lectures. Prerequisite: Junior standing.

**Mgt 413 Labor Law (4)**

Federal and state labor policy as expressed in common law, relevant statutes, and executive orders. Effects upon labor, management, minorities, and the public. Current rules analyzed in a contemporary and historical context. Understanding important industrial relations and manpower problems. 4 lectures. Prerequisite: Mgt 310 or consent of instructor.

**Mgt 414 Business Strategy and Policy Seminar (4)**

Application of interdisciplinary skills to comprehensive short and long range strategy and policy formulation. Analysis of the interdependence between external environments and internal systems. Case studies from a general management point of view. Integrating course of the core curriculum. 4 lectures. Prerequisite: All 300 level Business core courses.

**Mgt 415 Organization Development (4)**

General survey of development and trends in the field of organization development. Application of behavioral science knowledge and social technology to growth and change of organizations for the purpose of maximizing effectiveness. A systems approach focusing upon interaction subsystems of the organization and interfaces of the organization and the environment. 4 lectures.

**Mgt 418 Quantitative Methods and Controls in Business (3)**

Basic principles of quantitative controls as applied to the fundamental operations of business. For the senior student who needs descriptive and operational knowledge as a background for application in business analysis and decision. 3 lectures. Prerequisite: Senior standing or consent of instructor.

**Mgt 430 Internship (4-8)**

Business internship to permit student to correlate experience and academic knowledge. Placement as an employee in a business firm approved by the department head. Periodic written progress reports will be required, including collateral reading correlating the work experience with the literature in the area; research reports, and a final report. Prerequisite: Approval of the department head. Credit—no credit.

**Mgt 460 Senior Project (2)**

Selection and completion under faculty supervision of an investigative project typical of problems graduates must solve in their career field entry positions. Required minimum of 60 hours. Analytical formal report is required. Prerequisite: Bus 419.

**Mgt 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Mgt 488 Small Business Management (4)**

Application of management knowledge and skills to the specific managerial problems involved in planning and operating the smaller company; growth strategies; the art of securing performance; changing the organization structure to match growth; recruiting and compensating new personnel. 4 lectures. Prerequisite: Senior standing.

**Mgt 489 Analysis of International and Multinational Organizations (4)**

Integration of theoretical and applied managerial concepts, strategies, and organizational practices in: international and multinational organizations; administration of foreign operations; conflicts between domestic and international policies and practices; integration of cultural, technological, and organizational management imperatives in multinational and international operations. 4 lectures. Prerequisite: Mgt 302 or permission of instructor.

**Mgt 500 Independent Study (1-3)**

Advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Prerequisite: Formal petition with approval.

## **MANUFACTURING ENGINEERING**

**MfgE 100 Introduction to Manufacturing Engineering (3)**

Historical development of the world's physical manufacturing facilities and the profession of manufacturing engineering. Basics of manufacturing techniques. Review of career opportunities. Frequent outside speakers from industry. 3 lectures.

**MfgE 124 Industrial Logistics (3)**

Alternatives for traffic, transportation, inventory management, packaging, order processing, and material management. Interrelationships among functional areas of a firm as contributing to its profitability. 3 lectures.

**MfgE 137 Introduction to Skills (2)**

Technical vocabulary, English measuring system, blueprint reading, American industrial practice, classification of industrial skills. Introduction to modern American industrial processes including machining, welding, casting, and sheet metal working. Designed for international students. 1 lecture, 1 laboratory.

**MfgE 233 Computer Aided Manufacturing (2)**

Manual and computer programming systems for machining operations. Verification of control tapes by plotter techniques. Computer control in manufacturing utilizing IBM 360 and UNIAPT computer systems for machine control tape generation. 1 lecture, 1 laboratory. Prerequisite: ETME 142, ETMP 144.

**MfgE 252 Process Engineering (3)**

Theory and design for engineering manufacturing processes. Studies in material removal, machining economics, forming, and the design of workholding devices. 2 lectures, 1 laboratory. Prerequisite: IE 251.

**MfgE 307 Production Management (3)**

Planning, coordination and measurement for economical production. Forecasting, scheduling, economic order quantity, material utilization for job-shops and continuous production. Breakeven methods for analysis and design. 2 lectures, 1 laboratory. Prerequisite: IE 251, Math 241.

**MfgE 334 Machine Processing (3)**

Design and management concepts in numerical control of machine tools and industrial processes. APT programming for continuous path machining. Large computer vs. micro-processors. Program verification and operation of machine tools. 2 lectures, 1 laboratory. Prerequisite: MfgE 233.

**MfgE 341 Product Development (4)**

Systems-design approach to product conception, prototype development and production design. Production methods, human factors, and planning of integrated manufacturing facilities. 2 lectures, 2 laboratories. Prerequisite: IE 223 or consent of instructor.

**MfgE 421 Manufacturing Organization (3)**

Theory and principles of manufacturing organizations. Planning and operations in terms of controlled resources. Other resources and factors within and external to the firm. Systems engineering employed to assure effective use of available resources. 3 lectures. Prerequisite: Senior standing.

**MfgE 424 Engineering Test Design and Analysis (3)**

Design and statistical analysis of engineering experiments. Experimental methods for evaluation and comparison; accelerated, sequential, and non-parametric tests; interpretation of interference, fatigue, and field data; Weibull renewal analysis and warranty data. 3 lectures. Prerequisite: Stat 321 or equivalent.

**MfgE 425 Reliability Assurance (3)**

Reliability mathematical models, mechanical device reliability, electrical device reliability, reliability data, assurance program elements. 3 lectures. Prerequisite: Math 242, Stat 321, CSc 219 or IE 304.

**MfgE 426 Computer Design and Manufacturing (4)**

The utilization of computer technology in product design and development including tool design and process control. Concepts of Group Technology, Interactive Graphics and Computer Design Aids. 2 lectures, 2 laboratories. Prerequisite: IE 233 and IE 234 or consent of instructor.

**MfgE 431 Quality Assurance (3)**

Complete quality assurance and reliability functional programs. The application of statistics in control, and consequent production, of high quality and performance within cost constraints. 2 lectures, 1 laboratory. Prerequisite: IE 430.

**MfgE 437 Human Factors Engineering II (4)**

Principles, concepts and models used in maximizing human performance capabilities at the workplace. Experimental methods for generating rational data relative to man-machine interface. Data and multi-variate analysis. 3 lectures, 1 laboratory. Prerequisite: IE 319 and Stat 321 or equivalent.

**MfgE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours of total time.

**MfgE 463 Undergraduate Seminar (2)**

Professional presentation of formal discussions prepared primarily by senior students. Some seminars conducted by visiting professionals. Prerequisite: MfgE 462. 2 lectures.

## MARKETING

### **Mktg 204 Marketing Principles (4)**

Basic marketing institutions and functions they perform in the marketing process. Management of marketing in the economic, socio-cultural, and political-legal environment. 4 lectures. Prerequisite: Econ 201 or 221 or equivalent or consent of instructor. For nonbusiness majors.

### **Mktg 301 Marketing Analysis (4)**

The environment of marketing decisions and demand analysis. Modern methods of marketing problem definition, investigation, information management, and problem solving. 4 lectures. Prerequisite: Econ 222 and Stat 252 or equivalents.

### **Mktg 302 Marketing Information and Analysis (4)**

Information management for marketing decisions. Quantitative and qualitative research techniques for collection and analysis of marketing information. 4 lectures. Prerequisite: Mktg 301 or consent of instructor.

### **Mktg 303 Consumer Behavior (4)**

Application of behavioral science concepts as guides for marketing management, problem analysis and decision making. Cultural, social-psychological, and economic frameworks of consumer motivation, buying behavior, and consumption behavior. 4 lectures. Prerequisite: Psy 202 or equivalent, Mktg 301 or consent of instructor.

### **Mktg 304 Physical Distribution (4)**

Logistical systems approach to the physical movement of goods and services through time and space from original producers to ultimate consumers. Channels of distribution to industrial and consumer markets. Location analysis, packaging and packing, inventory management, loading and unloading, material handling, transportation. 4 lectures. Prerequisite: Mktg 301 or consent of instructor.

### **Mktg 305 Marketing Communications (4)**

Marketing management methods of communicating with industrial and consumer markets, distribution-channel members, suppliers, government and public organizations. Communications media available; their uses and limitations. 4 lectures. Prerequisite: Mktg 303 or consent of instructor.

### **Mktg 401 International Marketing (4)**

Marketing activities necessary to direct the flow of a company's goods and services to customers in global markets. 4 lectures. Prerequisite: Mktg 302 and senior standing or consent of instructor.

### **Mktg 405 Sales Management (4)**

Marketing activities necessary to manage a field sales force emphasizing the staffing, training, directing and control of sales personnel. 4 lectures. Prerequisite: Mktg 302 or consent of instructor.

### **Mktg 406 Marketing Management (4)**

Policy making and decision making applications in the planning, organizing, operating, controlling and evaluating of individual products and brands. 4 lectures. Prerequisite: Mktg 302 or consent of instructor.

### **Mktg 466 Marketing Problems Seminar (4)**

Application of modern methods to the exploration and analysis of current and potential marketing trends, opportunities, and problems. 4 meetings. Prerequisite: Senior standing, Mktg 406 or consent of instructor.

### **Mktg 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## MATHEMATICS

### Math 100 Mathematics for General Education (3)

Elementary topics in mathematics and the nature of mathematics. Intended to provide an appreciation of the aesthetic and cultural values of mathematics. For students not needing the specific mathematical skills required in scientific applications. 3 lectures.

### Math 102 Agricultural Mathematics (3)

Percentage problems in soils, dairy, horticulture, poultry, feeds, discount and interest, Pearson's square, equations, formulas, linear measurements, areas, volumes and proportions; concrete and lumber problems. 3 lectures.

### \* Math 103 Agricultural Mathematics (3)

Use of exponents, logarithms and trigonometric functions; basic land descriptions and measurement; mathematics of finance; basic statistics; work, horsepower and efficiency, pressure. Not open to students with credit in Math 120. 3 lectures. Prerequisite: Math 102.

### Math 105 Hand-Held Calculators (1)

Operation of multi-function calculators including all operations and memory and stack registers. Applications of the calculator to problems in mathematics and engineering. 1 lecture.

### \* Math 109 Introduction to College Mathematics (3)

Basic mathematical skills needed in science courses; consumer mathematics. Percentage, ratio and proportion, linear equations, exponents, logarithms, simple interest, and discount. 3 lectures.

### Math 111 Mathematics for Life Sciences (3)

Mathematical models in the life sciences, discrete probability, vectors and matrices. 3 lectures. Prerequisite: One year of high school algebra.

### \* Math 113 Algebra (3)

Systems of integers; fractions; polynomials and factoring; linear equations and systems of linear equations; exponents and radicals. Exercises in problems applied to agriculture. Intended for agricultural majors. Not open to students with credit in Math 114, 118, 120, or courses for which these are prerequisites. 3 lectures. Prerequisite: One year of high school algebra.

### \* Math 114 College Algebra (3)

Continuation of Math 113. Quadratic equations; graphical functions; inequalities; exponential and logarithmic functions; progressions; applications to agricultural problems wherever applicable. This course primarily intended for agricultural majors. Not open to students with credit in Math 118 or 120 or courses for which they are prerequisites. 3 lectures. Prerequisite: Math 113 or equivalent.

### \* Math 115 Trigonometry for Agriculture (3)

Trigonometric functions of acute angles and related angles; graphs, radian measure, fundamental identities, functions of two angles, applications of right and oblique triangles, and logarithmic applications. Not open to students with credit in Math 119 or 120 or courses for which they are prerequisites. 3 lectures. Prerequisite: Math 114 or equivalent.

### \* Math 118 Pre-Calculus Algebra (4)

Pre-calculus college algebra without trigonometry. Special products and factoring; exponents and radicals; partial fractions; fractional and quadratic equations; determinants; systems of equations; graphing; inequalities and absolute value; mathematical induction; binomial theorem; logarithms; complex numbers. Not open to students with credit in Math 120. 4 lectures. Prerequisite: Math 113 or equivalent.

\* Not open to students having a grade of C or better in Math 141 or equivalent.



**\* Math 119 Analytical Trigonometry for Engineers (3)**

Rectangular and polar coordinates; trigonometric functions, fundamental identities; inverse trigonometric functions and relations; complex numbers. Not open to students with credit in Math 115 or Math 120. 3 lectures. Prerequisite: Math 118 or equivalent.

**\* Math 120 College Algebra and Trigonometry (5)**

An integrated review course in college algebra and trigonometry covering function concept and symbols, rectangular co-ordinates, trigonometric functions, linear and quadratic functions, inequalities, analysis of trigonometric functions, inverse trigonometric functions, exponential and logarithmic functions, systems of equations and complex numbers. 5 lectures. Prerequisite:  $1\frac{1}{2}$  years of high school algebra and trigonometry.

**Math 121 Finite Mathematics (3)**

Sets and counting problems. Probability theory including stochastic processes, probability distributions, and Markov Chains. The algebra of vectors and matrices, Gaussian elimination, and the inverse of a square matrix. Applications of matrices. 3 lectures. Prerequisite: Math 118 or equivalent.

**Math 131, 132, 133 Technical Calculus (4) (4) (4)**

Functions, their graphs and limits; techniques and applications of differential and integral calculus; introduction to applied differential equations. Designed principally for technology students and others interested in an applied three-quarter calculus sequence. Not open to students with credit in Math 142, 143, 318 (respectively) or equivalents. 4 lectures. Prerequisite: Math 118 and 119 or equivalent.

**Math 141 Analytic Geometry and Calculus (4)**

Introduction to analytic geometry and calculus. 4 lectures. Prerequisite: Math 118 and 119 or equivalent.

**Math 142 Analytic Geometry and Calculus (4)**

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 141.

**Math 143 Analytic Geometry and Calculus (4)**

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 142.

**Math 204 Mathematics of Matrices (3)**

Matrices, inverses, linear systems, characteristic values, applications. 3 lectures. Prerequisite: Math 141 or consent of instructor.

**Math 210 Models in Finite Mathematics (3)**

Application of matrix theory to Markov Chains; linear programming and duality; the simplex method; graphs; matrix games. Not open to students with credit in Math 211. 3 lectures. Prerequisite: Math 121.

**Math 211 Mathematics for Life Sciences (3)**

Discrete and continuous models in the life sciences, linear programming, Markov chains and difference equations. Not open to students with credit in Math 210. 3 lectures. Prerequisite: Math 111.

**Math 221 Calculus for Business and Economics (4)**

Polynomial calculus for optimization and marginal analysis; partial derivatives and elementary integration. Not open to students with credit in Math 143, Math 133 or equivalent. 4 lectures. Prerequisite: Math 118 or equivalent.

**Math 222 Mathematical Analysis for Economics and Business (4)**

Multivariate calculus, Lagrange multipliers; linear algebra and determinants; differential and difference equations. 4 lectures. Prerequisite: Math 221 or equivalent.

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\* Not open to students having a grade of C or better in Math 141 or equivalent.

**Math 241 Analytic Geometry and Calculus (4)**

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 143.

**Math 242 Differential Equations (4)**

Ordinary differential equations: introduction with applications in engineering and science; classification of equations and their analytic solutions; study of interrelationships between differential systems, graphs, and physical problems. 4 lectures. Prerequisite: Math 241.

**Math 248 Methods of Proof in Mathematics (3)**

Methods of proof (direct, contradiction, conditional, contraposition); examples from set theory; quantified statements and their negations; functions, indexed sets, set functions; proofs in analysis; proof by induction; equivalence and well-defined operations and functions; the axiomatic method. 3 lectures. Prerequisite: Math 241.

**Math 304 Vector Analysis (4)**

Algebra of free vectors with applications. Differential and integral calculus of vectors. Development of theory and application of vector operations. Green's Theorem, Stokes' Theorem, and the Divergence Theorem. 4 lectures. Prerequisite: Math 242.

**Math 312 Linear Algebra (4)**

Vector spaces, inner products, linear transformations, linear independence, matrix algebra, linear algebraic systems, determinants, eigenvalues, eigenvectors, applications. 4 lectures. Prerequisite: Math 204.

**Math 313 Linear Algebra (4)**

Bilinear and quadratic forms, spectral decomposition, canonical forms, multilinear algebra, tensors, applications. 4 lectures. Prerequisite: Math 312.

**Math 318 Advanced Engineering Mathematics (4)**

Theory and applications of Laplace transforms; Fourier series and transform; matrices. 4 lectures. Prerequisite: Math 242.

**Math 319 Partial Differential Equations (3)**

Separation of variables. Orthogonal functions; Bessel functions, Legendre polynomials. Boundary value problems. Applications in vibrating strings and membranes, heat flow, potential theory. 3 lectures. Prerequisite: Math 318.

**Math 327 Modern Elementary Mathematics (3)**

Introduction to number systems. Natural numbers, whole numbers, and sets. Metric system of measurement. Nonmetric geometry and introduction to statistics. Emphasis on activity learning and application for elementary school teachers. 2 lectures, 1 activity. Prerequisite: one year of high school algebra, one year of high school geometry, three units of college mathematics and at least junior standing.

**Math 328 Modern Elementary Mathematics (3)**

Continued study of number systems. Integers, rational numbers, real numbers, finite operational systems, and elementary number theory. Functions and graphs. 3 lectures. Prerequisite: Math 327.

**Math 329 Modern Elementary Mathematics (3)**

Intuitive geometry and probability. Topics from metric and synthetic geometry. Topological concepts. Elementary probability theory and experiments. Emphasis on activity learning and applications for elementary school teaching. 3 lectures. Prerequisite: Math 328.

**Math 335 Graph Theory (3)**

Sets, permutations and combinations, finite graphs and digraphs, Euler paths and Hamiltonian paths, matrix representation of graph, connectedness, isomorphism, planar graphs, trees, applications. 3 lectures. Prerequisite: At least junior standing.

**Math 336 Combinatorial Mathematics (3)**

Permutations and combinations; generating functions; recurrence relations; inclusion and exclusion; Polya's theory of counting; transport networks; matching theory; block design. 3 lectures. Prerequisite: Math 143 or equivalent.

**Math 341 Theory of Numbers (4)**

Properties of numbers. Euclid's Algorithm, greatest common divisors, diophantine equations, prime numbers, congruences, number theoretic functions, the quadratic reciprocity laws, primitive roots and indices. 4 lectures. Prerequisite: Math 248 or consent of instructor.

**Math 381, 382 Modern Algebra (4) (4)**

Fundamental algebraic structures and types of algebras, including operations within them and relations among them. Groups, rings and fields. 4 lectures. Prerequisite: Math 248.

**Math 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of the department head.

**Math 403 Secondary School Mathematics (3)**

A study of the mathematical content of secondary school courses, with particular emphasis on the new curricular materials that have been introduced into the secondary school courses. 3 lectures. Prerequisite: At least junior standing.

**Math 405 Transform Engineering Methods (3)**

Applications of Z-transforms to engineering problems. The clarifying and unifying concepts of Z-transforms as found in mechanical engineering, marketing, maintainability, reliability, finance, inventory control, production control, forecasting, and Poisson processes. 3 lectures. Prerequisite: Math 242 and upper division standing.

**Math 408 Functions of a Complex Variable (4)**

Elementary analytic functions and mapping; Cauchy's Integral Theorem; Power series; Theory of residues and evaluation of integrals; harmonic functions. 4 lectures. Prerequisite: Math 242.

**Math 409 Complex Analysis (4)**

Further development of analytic function theory. Additional topics in calculus of residues, conformal mapping and the Poisson Integral. 4 lectures. Prerequisite: Math 408.

**Math 412, 413, 414 Advanced Calculus (3) (3) (3)**

Introduction to concepts and methods basic to real analysis. Topics such as real number system, continuity, uniform continuity, differentiation, the integral, uniform convergence, partial differentiation, implicit and inverse function theorems. 3 lectures. Prerequisite: Math 248.

**Math 419 Introduction to History of Mathematics (3)**

The evolution of mathematics from earliest to modern times. Contributions of prominent mathematicians. Development of mathematical concepts and techniques. Appropriate for prospective and in-service teachers. 3 lectures. Prerequisite: Math 143.

**Math 424 Organizing and Teaching Mathematics (3)**

Organization, selection, presentation, application and interpretation of subject matter in mathematics. For students who will be teaching in secondary schools. 3 lectures. Prerequisite: Math 403.

**Math 431, 432 Mathematical Optimization I-II (3) (3)**

Classical optimization: max/min of functions, linear and nonlinear optimization problems, duality, constrained optimization. Model building and applications to various fields. 3 lectures. Prerequisite: CSc 219 or consent of instructor.

**Math 435 Teaching Mathematics in the Elementary School (3)**

Development of mathematical concepts; the discovery or laboratory approach to learning and the role of manipulative or visual materials; teaching the mathematical rationale of fundamental operations; necessity for a sequential and organized program; the newer curricular materials and their place in the total program; problem solving; evaluation. 3 lectures. Prerequisite: Ed 335 and Math 327 or consent of instructor.

**Math 437 Game Theory (3)**

Definition of a matrix game and the minimax theorem. Optimal strategies for matrix games; discrete games. Mathematical formulation of problems and solutions. 3 lectures. Prerequisite: Math 204 or 210 or 312.

**Math 442 College Geometry (3)**

Modern development of the basic concepts of plane and solid Euclidean geometry including a coordinate treatment; selected topics in advanced Euclidean geometry. 3 lectures. Prerequisite: Math 248 and at least junior standing.

**Math 443 Non-Euclidean Geometry (3)**

Review of attempts to prove Euclid's fifth postulate as a point of departure in the discovery of non-Euclidean geometry; building an axiom system free of intuitive prejudice; hyperbolic plane trigonometry. Particularly appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Math 442.

**Math 444 Projective Geometry (3)**

Geometric and algebraic treatment of such topics as primitive forms, ideal elements, incidence and duality. Certain geometric properties preserved by projections; and construction of special figures. 3 lectures. Prerequisite: at least junior standing. Math 442 recommended.

**Math 459 Undergraduate Seminar (2)**

Reports and discussions by students, through seminar format, on topics in mathematics education, applied mathematics, or finite mathematics. 2 activity periods. Prerequisite: Math 242 and either Math 312 or Math 381.

**Math 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Math 459.

**Math 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: consent of instructor.

**Math 505 Foundations of Mathematics (3)**

Development of the primitive materials and concepts necessary to an understanding of the axiomatic method dealing with sets and logic. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**Math 506 Topics in Modern Algebra (3)**

Topics selected from group theory, ring theory, unique factorization, group representation, module theory and linear algebra. 3 lectures. Prerequisite: Math 382 and 312 or equivalent and graduate standing.

**Math 507 Structure of Geometry (3)**

Transformations and geometries; affine, topological and analytic. Appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Graduate standing or consent of instructor; Math 442 recommended.

**Math 508 Introduction to Topology (3)**

Basic ideas of general topology, metric spaces, homeomorphisms and the separation axioms. 3 lectures. Prerequisite: Math 412 and graduate standing or consent of instructor.

**Math 510, 511 Survey of Modern Mathematics (3) (3)**

Selected topics from the field of modern mathematics: projective, and synthetic geometry, topology, logic, matrices, vectors, theory of games, probability, linear and modern algebra and convex sets, Boolean algebras, graph theory, Lattice theory, geometry of complex numbers. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**Math 512, 513 Partial Differential Equations of Physical Systems (3) (3)**

Partial differential equations of first and second order. Laplace's equation, wave equation, diffusion equation and others; methods for their analytical solution. 3 lectures. Prerequisite: Math 318 and graduate standing or consent of instructor.

**Math 515 Real Analysis (3)**

Introduction to Lebesgue measure and integration, convergence theorems,  $L_p$  spaces, Radon-Nikodym theorem and Fubini's theorem. 3 lectures. Prerequisite: Math 413 and 508 or consent of instructor.

**Math 516 Linear Operators (3)**

Linear spaces, operator theory and operational calculus. Applications to differential equations, integral equations, transforms and Fourier analysis. 3 lectures. Prerequisite: Math 515 and graduate standing or consent of instructor.

**Math 518 Advanced Ordinary Differential Equations (3)**

Existence, continuation and dependence on parameters of solutions. Linear systems, initial and boundary value problems. Self-adjoint eigenvalue problems. 3 lectures. Prerequisite: Math 318 and graduate standing or consent of instructor.

**Math 519 Topics in History of Mathematics (3)**

Selected topics in the development of concepts and techniques in mathematics from earliest times to the present. May be repeated up to a total credit of 6 units. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**Math 540 Foundations for Quantitative Methods (4)**

Intensive foundation course for the MBA program. Optimization of functions of one and several variables; elements of matrix theory applied to linear programming, duality, transportation and assignment problems, and other topics in decision theory for business and economics. 4 lectures. Prerequisite: Graduate standing.

**Math 580 Seminar (1-2-3)**

Built around topics in advanced mathematics chosen according to the common interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. 1, 2, or 3 meetings. Total credit limited to 12 units. Prerequisite: Graduate standing and consent of instructor.

**Math 596 Thesis (3) (3)**

Serious research endeavor devoted to the development, pedagogy or learning of mathematics. Prerequisite: Graduate standing and consent of instructor.

## **MECHANICAL ENGINEERING**

**ME 134 Mechanical Systems (3)**

Analysis, synthesis, and testing of mechanical systems, their components and instruments. 2 lectures, 1 laboratory.

**ME 136 Thermal Systems (2)**

Analysis and synthesis of thermal systems, their components and instruments. 1 lecture, 1 activity. Corequisite: ME 146.

**ME 146 Thermal Systems Laboratory (1)**

Testing of thermal systems, their components and instruments. 1 laboratory. Corequisite: ME 136.

**ME 211 Engineering Mechanics (3)**

Analysis of forces on engineering structures in equilibrium. Properties of forces, moments, couples, and resultants. Equilibrium conditions, friction, centroids, area moments of inertia. Introduction to mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures. Prerequisite: Math 241 (or concurrently), Phys 131.

**ME 212 Engineering Mechanics (4)**

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. 4 lectures. Prerequisite: Math 241, ME 211.

**ME 234 Mechanical Engineering Systems (4)**

Analysis, synthesis and testing of thermal and mechanical systems, their components and instruments. For qualified transfer students. 3 lectures, 1 laboratory. Prerequisite: Phys 132.

**ME 302 Thermodynamics I (3)**

Properties and fundamental relations for processes involving gases and vapors. First and second laws of thermodynamics. 3 lectures. Prerequisite: Phys 132, Math 143, Chem 125.

**ME 303 Thermodynamics II (3)**

Power and refrigeration cycles. Property relations for real gases. Mixtures of gases and vapors, psychrometry combustion. 3 lectures. Prerequisite: ME 302, Engr 251.

**ME 310 Nuclear Reactor Engineering I (4)**

Introduction to nuclear energy, reactor physics, basic power plant design and operation. Radioactivity experiments and analog simulation methods. 3 lectures, 1 laboratory. Prerequisite: Chem 125.

**ME 316 Mechanical Vibrations (3)**

Free vibration, damping, transient and steady state response to forced vibrations. Engineering methods, single and multiple degrees of freedom. 3 lectures. Prerequisite: Math 318, ME 212.

**ME 317 Vibrations Laboratory (1)**

Experimental studies of the dynamic behavior of structures and machines. Instrumentation methods utilized in field and laboratory. Analog techniques. 1 laboratory. Concurrent: ME 316: Prerequisite or concurrent: EE 201.

**ME 324 Kinematics (4)**

The study of motion in machine parts. Displacements, velocities, and accelerations in linkage, cams, gears, and other mechanisms. 2 lectures, 2 two-hour laboratories. Prerequisite: ETME 141, ME 212.

**ME 327 Introduction to Design (5)**

Design of machine parts by stress and deflection. Effects of fluctuating stresses and stress concentration. Design of gears, clutches, brakes, bearings, shaft and other machine parts. Modern industrial design practice using standard components and design layout drawings. 4 lectures, 1 laboratory. Prerequisite: CE 207, CE 229 (or concurrent), ETME 141, Met 306.

**ME 341, 342 Fluid Mechanics (3) (3)**

Fluid statics. Conservation equations of fluid dynamics. Viscous flow, boundary layer concepts, lift and drag, compressible flow, turbomachinery. ME 341: 3 lectures. Prerequisite: ME 212. ME 342: 3 lectures. Prerequisite: ME 341, Engr 251.

**ME 343 Thermodynamics Laboratory (1)**

Experimental methods applied to the evaluation of machine performance, processes and verification of theory. Thermodynamic processes, heat transfer characteristics, and combustion phenomena. Planning experiments, interpretation of results, preparation of reports. 1 laboratory. Prerequisite: ME 303, 342, 146 or 234, EnvE 313.

**ME 345 Fluid Mechanics Laboratory (1)**

Fluid mechanics experiments in pipe flow, flow measurement, turbomachinery, lift and drag, nozzle flow, and applications of the conservation equations of fluid mechanics. 1 laboratory. Corequisite: ME 342.

**ME 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ME 401, 402 Stress Analysis (4) (4)**

Finite-element stress analysis, computer programs, elasticity. Beams, shrink fits, thick walled pipes, torsion, stress concentrations. Experimental stress analysis. 3 lectures, 1 laboratory. Prerequisite: CE 207, Math 318, Engr 251.

**ME 410 Nuclear Reactor Experiments (3)**

Experiments using the AGN-201 nuclear reactor. Flux traverse, power calibration, control rod calibration, and period measurement. 2 lectures, 1 laboratory. Prerequisite: Phys 210.

**ME 411 Nuclear Reactor Engineering II (4)**

Reactor thermal and hydraulic design. Heat transfer in and from reactor elements. Pressure drop and heat transfer in two-phase flow. 4 lectures. Prerequisite: ME 341, EnvE 313, Chem 125.

**ME 412 Nuclear Reactor Engineering III (4)**

Advanced thermal and fast type nuclear power plants; engineering design and operational characteristics, safety analysis and environmental considerations. Operational experiments with training-type nuclear reactor. 3 lectures, 1 laboratory. Prerequisite: ME 411, Phys 421.

**ME 415 Energy Conversion (3)**

Mechanical engineering aspects of energy sources, conversion and storage. Fuels and other resources, solar energy, and energy storage systems. Recommended as a complement to EE 414. 3 lectures. Prerequisite: ME 302.

**ME 417 Advanced Vibrations (4)**

Vibration of complex engineering systems. Inertia and stiffness matrices. Natural frequencies and normal modes. Approximate solutions and computer techniques. Response to transient and periodic inputs. 3 lectures, 1 laboratory. Prerequisite: ME 316, Engr 251.

**ME 422 Mechanical Control Systems (4)**

Analytical modeling and compensation of mechanical control systems. Design of mechanical, hydraulic and fluid systems using analog and digital simulation techniques. 3 lectures, 1 laboratory. Prerequisite: ME 316, 317.

**ME 424, 425 Design of Piping Systems (4) (4)**

Functions, requirements, and design of piping systems, including safety and economic considerations for power, chemical, and process plants. Welding and other forms of joint construction, materials specifications, sizing, layout, flexibility, support, insulation, and cost estimation of water, steam, air, gas, and corrosive and viscous fluid systems. Philosophy, background, and requirements of principal governing National Codes. 3 lectures, 1 laboratory. Prerequisite: CE 207, ME 341, Engr 251.

**ME 426 Dynamics of Mechanical Systems (4)**

Analysis of dynamic problems in machine design. 3 lectures and 1 two-hour activity. Prerequisite: ME 316, 324, or consent of instructor.

**ME 427 Case Studies (4)**

Selected cases, illustrations and examples to stress the importance of various approaches and effects of approximations in engineering designs, computations, and judgments. 2 lectures, 2 activities. Prerequisite: ME 327, 316 or consent of instructor.

**ME 428 Design (4)**

Basic design techniques such as brainstorming, feasibility studies, models, case studies, design decisions and compromises. Industrial participation design program. 2 lectures, 2 laboratories. Prerequisite: ME 324, 327, Engr 251.

**ME 431 Mechanical Design Technique (4)**

A comprehensive study of various design methods and techniques. Optimization techniques used to explore various structural concepts such as prestressing, statistical screening, decision modeling. Simulation of systems using digital computer. Design criteria identification of design parameters and constraints. 3 lectures, 1 laboratory. Prerequisite: ME 316, 327.

**ME 435 Petroleum Production Development (4)**

Theory and practice of oilwell planning, drilling and completion applied to the development of new oil production. Planning and operation of offshore deep water drilling systems. 4 lectures. Prerequisite: ME 327.

**ME 436 Petroleum Production Surface Operation (4)**

The design, operation and maintenance of surface equipment required in oil production. The processes and systems involved are well pumping, fluid gathering and storage, separation of oil, gas, water and sediment from produced fluid. Includes equipment used in processes of water flood, steam stimulation and in situ combustion. 4 lectures. Prerequisite: ME 342.

**ME 438 Heat Exchanger Design (4)**

Theory and application of numerical, analytical, and experimental methods to selected heat transfer problems. Application of principles of conduction, convection, condensation, and boiling heat transfer, stress, and vibrations to design of heat exchange equipment. 4 lectures. Prerequisite: ME 342, EnvE 313, ME 303, Engr 251.

**ME 440 Thermal System Design (3)**

Techniques used to design thermal systems. Economic considerations, mathematical modeling, and simple optimization techniques in performance analysis of thermal systems. 2 lectures, 1 laboratory. Prerequisite: ME 302, 341, EnvE 313.

**ME 441 Advanced Thermodynamics (4)**

Maxwell relations, clapeyron equation, activity, activity coefficient, and fugacity. Phase and chemical equilibrium. Selected modern applications of thermodynamics. 4 lectures. Prerequisite: ME 303.

**ME 442 Dynamics and Thermodynamics of Compressible Flow (4)**

Control volume analysis of fluid-thermo equations for one-dimensional, compressible flow involving area change, normal shocks, friction, and heat transfer. Two-dimensional supersonic flow including linearization, method of characteristics, and oblique shocks. One-dimensional constant area, unsteady flow, 4 lectures. Prerequisite: Math 242, ME 303, 342.

**ME 443 Turbomachinery (4)**

Performance characteristics. Two-dimensional cascades. Axial flow turbines. Axial flow compressors, pumps and fans. Three-dimensional flows in axial turbomachines. Centrifugal pumps, pumps and compressors. 4 lectures. Prerequisite: ME 303, 342, Math 318.

**ME 444 Combustion Engine Design (4)**

Application of design parameters to the various engine cycles. Aspects of the combustion processes. Energy conversion including losses and cooling. Static and dynamic loading. 3 lectures, 1 laboratory. Prerequisite: ME 303.

**ME 445 Convective Heat and Mass Transfer (4)**

Forced convection in laminar and turbulent flow, free convection, diffusion, combined heat and mass transfer. 4 lectures. Prerequisite: ME 341, EnvE 313.

**ME 446 Design of Fluid Power Systems (4)**

Energy transmission and control by fluid systems. Load analysis, performance specification, and system development for fluid power. Fluidics. 4 lectures. Prerequisite: ME 342.



**ME 450 Solar Power Systems (4)**

Recommend as complement to ME 415. High and intermediate temperature systems for conversion of solar energy to mechanical power and heat. Thermal energy storage and total thermal energy system design. 3 lectures, 1 laboratory. Prerequisite: ME 302, EnvE 313.

**ME 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

**ME 463 Undergraduate Seminar (2)**

New developments, policies, practices, and procedures are discussed through regular seminar. Each individual is responsible for the development and presentation of a topic in the chosen field. 2 meetings. Prerequisite: Senior standing.

**ME 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**ME 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**ME 550 Kinematic Analysis and Design (3)**

Analysis and design of mechanical linkages by means of geometric and algebraic methods. Optimization studies. 3 lectures. Prerequisite: ME 324 or equivalent.

**ME 551 Mechanical Systems Analysis (3)**

Various system modeling methods applied to mechanical systems. System stability studies and system optimization methods. 3 lectures. Prerequisite: Consent of instructor.

**ME 552 Conductive Heat Transfer (3)**

Theory of steady-state and transient conduction in isotropic and anisotropic media. Development of differential equations, solutions by series, conformal mapping, transforms, finite differences. Concentrated and distributed heat sources. 3 lectures. Prerequisite: ME 342, 303, EnvE 313, Math 318; or consent of instructor.

**ME 553 Convective Heat Transfer (3)**

Analysis of convective transfer of energy, mass and momentum. High speed flow and ablation. Phase change heat transfer. 3 lectures. Prerequisite: EnvE 313, ME 342, Math 318.

**ME 556 Stability of Structural Systems (3)**

Static and dynamic analysis of structural and mechanical systems, stability analysis by solution of differential equations, energy methods, perturbation methods. Buckling of columns, torsional buckling, dynamic buckling. 3 lectures. Prerequisite: Consent of instructor.

## **METALLURGICAL ENGINEERING**

**Met 121 Introduction to Metallurgical Engineering (3)**

Nature and identification of metals production, joining and working processes. Basic metallurgical laboratory techniques. Macro and micro etching and preparation of metallographic specimens. Metallurgical engineering reports, calculations associated with engineering. 1 lecture, 2 laboratories.

**Met 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**Met 222 Physical Metallurgy (4)**

Lattice structures, cooling curves, alloy systems. Mechanical test methods, strength, ductility, modulus of elasticity. Heat treatment, isothermal transformation diagrams. Application of principles for selection of metals for corrosion resistance. Other engineering metals, including tool steel, stainless steel and cast iron. 3 lectures, 1 laboratory. Prerequisite: Met 306 or consent of instructor.

**Met 223 Nonferrous Alloys (2)**

Basic theory of major alloy systems involving nonferrous metals, such as aluminum, titanium and copper. Emphasis on phase relations, mechanical properties, processing and procurement. Heat treatment and precipitation hardening. 1 lecture, 1 laboratory. Prerequisite: Met 222.

**Met 235 Metallurgy for Engineering Technology (4)**

Physical and mechanical properties of metals and alloys. Selection, heat treatment, and use of metals and alloys. Steel, cast iron, stainless steel, and non-ferrous alloys. Fabrication problems and their solution. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing in Engineering Technology.

**Met 301, 302, 303 Theory of Materials (4) (4) (4)**

Fundamentals of material science; concepts and problems relating single and polycrystalline structure of metals to their behavior in use. Uniaxial and complex static stresses; effects of temperature and rate of loading; elastic and plastic deformation; electrical, magnetic, and thermal behavior; fatigue and creep. Statistical evaluation of experimental data. 3 lectures, 1 laboratory. Prerequisite: Math 241, Phys 133, ME 211, Chem 125; Engr 251, or consent of instructor.

**Met 306 Materials Engineering (3)**

Structure of matter. Physical and mechanical properties of materials including metals, alloys, ceramics, insulating materials, semi conductors and polymers. Equilibrium diagrams. Heat treatments, material selection and corrosion phenomenon. 3 lectures. Prerequisite: Sophomore standing in major, Phys 132, Chem 124 or instructor's permission.

**Met 324, 325, 326 Metallurgical Engineering (4) (4) (4)**

Extractive metallurgy, steel mill and foundry theory and practice, metal fabrication processes. Heat treatment, atmosphere furnaces, bright annealing, carbon restoration. Welding metallurgy. Failure investigation, metallography including electron microscopy. Application of nondestructive testing, X-ray, ultrasonic. Codes and specifications. 2 lectures, 2 laboratories. Prerequisite: Met 223.

**Met 341 Materials Engineering Laboratory (1)**

Laboratory experiments with materials. Heat treating of steel and aluminum alloys and mechanical evaluation. Identification of microstructures, corrosion testing, cold working and annealing, cooling curves and impact testing. 1 laboratory. Prerequisite or concurrent: Met 306.

**Met 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**Met 421, 422, 423 Advanced Theory of Materials (4) (4) (4)**

Metallurgical thermodynamics; solid state transformations, mechanisms and kinetics. Theory of alloying, diffusion, dislocations, plastic deformation, strengthening mechanisms, precipitation hardening, martensitic reactions, and solidification. Metallurgical computations. 4 lectures. Prerequisite: Met 303, 326, Chem 306.

**Met 424, 425, 426 Applied Metallurgical Engineering (4) (4) (4)**

Fracture mechanics. Fatigue, environment assisted cracking, galvanic corrosion, gas-metal interaction, corrosion control. X-ray diffraction, polymers, ceramics. Investigation of actual service failures; advanced metallography and photomicrography; preparation of formal engineering reports. 2 lectures, 2 laboratories. Prerequisite: Met 303, 326, Chem 326.

**Met 434 Welding Engineering (3)**

Weldability studies of high strength, low alloy steels and the important metallurgical aspects of welded fabrication. 1 lecture, 2 laboratories. Prerequisite: Met 306.

**Met 435 Welding Engineering (3)**

Principles of welded pressure vessel design and fabrication in accordance with governing codes. Material selection, process selection, procedure. Performance qualifications of pressure vessels; cost estimating. 1 lecture, 2 laboratories. Prerequisite: Met 434.

**Met 436 Welding Engineering (3)**

Weldability and metallurgical studies of aluminum and aluminum alloys, stainless and heat resisting steels, and titanium and titanium alloys. Principles of process selection. 1 lecture, 2 laboratories. Prerequisite: Met 435.

**Met 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**Met 463 Undergraduate Seminar (2)**

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Senior standing.

**Met 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Met 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**Met 562 Mechanical Metallurgy (3)**

Analysis of stress and strain in solids; elements of theory of elasticity and plasticity, and their applications to metal forming. Residual stresses, theory of dislocations, theory of recrystallization, effects of temperature and rate of loading; fracture mechanics, fatigue and creep. 3 lectures. Prerequisite: Met 306 or consent of instructor.

**Met 564 Fracture Mechanics and Stress Corrosion Cracking (3)**

Stress analysis of cracks, energy analysis of fracture process, fracture toughness testing, fail safe design, the use of fracture mechanics in describing fatigue and stress corrosion cracking. 2 lectures, 1 laboratory. Prerequisite: Met 306, CE 208, and graduate standing.

## **MILITARY SCIENCE**

**MSc 101 (MS-1) U.S. Defense Establishment (1)**

Nature of conflict and war; international power factors and balance of power concept; organization and functions of the U.S. defense establishment; roles of the military departments. 1 lecture.

**MSc 102 (MS-1) Military History (1)**

Overview of American military history from the colonial period to 1902; application of the principles of war to significant battles and campaigns; evolution of weapons and tactics. 1 lecture.

**MSc 103 (MS-1) Military History (1)**

Overview of American military history from 1902 to the present; application of the principles of war to significant battles and campaigns; evolution of the military establishment; evolution of weapons and tactics. 1 lecture.

**MSc 201 (MS II) Orienteering (2)**

Principles of orienteering and land navigation; military map system; techniques of orientation and navigation using maps and compass. 2 lectures.

**MSc 202 (MS II) Small Unit Leadership (2)**

Principles of tactics and operations; organization of small units and their employment; field orders and instructions; small unit leadership techniques. 2 lectures.

**MSc 203 (MS II) Leadership and Management (2)**

Principles of leadership; principles of resource management; group goal attainment focusing on leader, group, and situational needs. 2 lectures.

**\*MSc 301, 302, 303 (MS III) Advanced Leadership and Management (3) (1) (3)**

Personnel management problems and techniques of motivation as applied to a military environment; techniques and methods of instruction; tactical problems and techniques adaptable to the small military organization; military communications. MSc 301: 3 lectures. MSc 302: 1 lecture. MSc 303: 3 lectures.

**\*MSc 401, 402, 403 (MS-IV) Seminar in Selected Leadership Topics (3) (3) (1)**

Role of the United States Army in world change and its implications. Theory and dynamics of the military team; analysis of administrative/staff operations and procedure. Philosophy, purpose and administration of military law and military justice system. MSc 401: 3 lectures. MSc 402: 3 lectures. MSc 403: 1 lecture.

## **MUSIC**

**Mu 100 Music Fundamentals—Applied (3)**

The study of traditional music notation: use of treble staff for pitch and rhythm, chord symbols and harmonization using principal triads, major and minor, and common seventh chords. 2 lectures, 1 activity.

**Mu 101 Theory I (3)**

Elements of music theory covering: notation, construction of major and minor scales and keys, signatures, intervals, diatonic triads, triad forms, inversions, study of meter and rhythm, elementary ear training. 3 lectures.

**Mu 102 Ear-Training and Sight-Singing (1)**

A systematic development of skills in reading musical notation. Students are taught to hear mentally what they see and to reproduce rhythm and pitch accurately through singing. 1 activity.

**Mu 111 Beginning Piano (1)**

Beginning piano for student with no background in keyboard instruments. Includes fundamentals of notation, keyboard techniques, tone production, sightreading and facility. 1 activity.

**Mu 112, 113 Class Piano (1) (1)**

A continuation of Mu 111. Piano for students with the ability to play a simple Bach or Mozart Minuet. Prerequisite: Mu 111 or equivalent. 1 activity.

**Mu 131 Guitar (1)**

Fundamentals of guitar technique and performance including elements of both classical and folk guitar. Designed to meet the needs of the public school teacher. No previous experience necessary. 1 activity.

\* Students who are participants in the ROTC program are required to take for no additional academic credit four hours per month of field instruction in applied leadership and management.

**Mu 141 University Jazz Band (Collegians) (1)**

Limited to those who have had considerable experience playing musical instruments. Students have an opportunity to play for various entertainments, dances, community programs, several tours and the Home Concert. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 142 Studio Band (1)**

Open to qualified instrumentalists concurrently enrolled in a major instrumental ensemble. Rehearsal and public performance of jazz and jazz/rock music at athletic events, band concerts, and other campus and community events. 1 activity. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 144 Symphony Orchestra (1)**

Open to any college student whose technique is adequate. In addition to standard repertory, the orchestra emphasizes unusual or rarely performed works. Select members of the orchestra are given additional opportunities to perform chamber music. 1 laboratory. Prerequisite: Consent of instructor. Total credit limited to 6 units.

**Mu 147 Instrumental Ensembles (1)**

Open to qualified musicians. Rehearsal and public performances in trios, quartets, and quintets. 1 activity. Prerequisite: permission of the instructor. Total credit limited to 6 units.

**Mu 151 Band (1)**

Limited to those students who have had experience with band instruments. The band plays for many college functions, assemblies, athletic games, and rallies, and makes at least one trip each year. Smaller groups are organized from the band for special functions. 1 laboratory. Total credit limited to 6 units.

**Mu 152 University Winds (1)**

Study and public performance of music written for small wind ensembles (woodwinds, brass and percussion) from the sixteenth century to the present. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 154 Men's Glee Club (1)**

Study and performance of choral music composed for men's voices. The club performs several times on campus, including Home Concert, and sponsors an annual spring tour. Smaller specialty ensembles, vocal solos, and instrumental accompaniments afford further opportunities for members to develop their musical talents. Tryouts in fall only. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 155 University Singers (1)**

Study and public performance of music for mixed voices from the sixteenth century to the present. Total credit limited to 6 units. 1 laboratory. Prerequisite: Permission of instructor.

**Mu 157 Women's Glee Club (1)**

Study and performance of choral music composed for women's voices. The club performs several times on campus, including Home Concert, and sponsors an annual spring tour. Smaller specialty ensembles, vocal solos, and instrumental accompaniments afford further opportunities for members to develop their musical talents. Tryouts in fall only. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 158 Choral Jazz Ensemble (1)**

Open to qualified singers and instrumentalists. Rehearsal and public performance of choral jazz. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 167 Vocal Ensemble (1)**

Open to qualified singers. Rehearsal and public performance of vocal music. 1 activity. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 203 Theory II (3)**

Structure of tonality in music of Western civilizations, four-part writing of triads in root position and inverted, cadences and melodic structure, harmonic progressions, harmonization of a melody and nonharmonic tones. 3 lectures. Prerequisite: Mu 101 or consent of instructor.

**Mu 204, 205 Appreciation (3) (3)**

Introduction to the elements and concepts of music, leading to greater understanding of art music. Discussion of the styles, forms, and specific composers in Western music. May be taken in any order. 3 lectures.

**Mu 209 History and Literature of Jazz (3)**

Survey of jazz from the 1920's to the present; its historical background and development in the United States. Big bands, combos, and soloists. Extensive use of recordings and live presentations. 3 lectures.

**Mu 211, 212, 213 Class Piano (1) (1) (1)**

Intermediate level piano techniques with emphasis on style, interpretation, sight-reading, basic performance practices, and the solution to general musical problems. The classes proceed progressively. Total credit in each course limited to 2 units. 1 activity. Prerequisite: One year of piano or equivalent.

**Mu 231 Instruments—Theory and Performance (1)**

Study of the fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Separate sections arranged with instructor. Total credit limited to 6 units. 1 activity.

**Mu 237, 238, 239 Voice—Theory and Performance (1) (1) (1)**

Study of the fundamentals of singing; breathing, posture, diction, development of voice, resonating chambers, vocal interpretation, sight singing. 1 activity.

**Mu 301 Music for Children (3)**

Development of basic music proficiency; singing, conducting, playing simple instruments, accompaniment, rhythmic activities. Assumes a knowledge of music fundamentals. 3 lectures. Prerequisite: Mu 100, 101 or 203.

**Mu 303 Theory III (2)**

The dominant seventh chord, nondominant seventh chord, modulation, augmented sixth chord, and neopolitan sixth chord. 3 lectures. Prerequisite: Mu 203 or consent of instructor.

**Mu 308, 309 Conducting (2) (2)**

Principles and techniques in conducting with experience in score reading. 2 lectures. Prerequisite: Mu 101 or equivalent.

**Mu 311, 312, 313 Class Piano (1) (1) (1)**

Designed for the advanced student able to play a Mozart or Beethoven sonata. Emphasis on general knowledge of piano literature, interpretation, style, and performance practices. Admission to the class by audition. Fall quarter emphasis, Baroque keyboard literature; winter quarter, Classic; spring quarter, Romantic and Contemporary. Total credit in each course limited to 2 units. 1 activity.

**Mu 331 Instruments (1)**

Study of the fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Continuation of Mu 231. Total credit limited to 6 units. 1 activity.

**Mu 337, 338, 339 Voice (1) (1) (1)**

Study of the fundamentals of singing; breathing, posture, diction, development of voice, resonating chambers, vocal interpretation, sight singing. Continuation of Mu 237, 238, 239. 1 activity. Prerequisite: One year of voice or equivalent.

**Mu 341 University Jazz Band (Collegians) (1)**

Limited to those who have had two years of Jazz Band experience. Students have an opportunity to play for various university entertainments, dances, community programs, several tours and the Home Concert. 1 laboratory. Total credit limited to 6 units. Prerequisite: Two years of University Jazz Band participation.

**Mu 342 Studio Band (1)**

Open to qualified instrumentalists concurrently enrolled in a major instrumental ensemble. Rehearsal and public performance of jazz and jazz/rock music at athletic events, band concerts, and other campus and community events. 1 activity. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 344 Symphony Orchestra (1)**

Open to any college student whose technique is adequate. In addition to standard repertory, the orchestra emphasizes unusual or rarely performed works. Select members of the orchestra are given the additional opportunities to perform chamber music. Total credit limited to 6 units. 1 laboratory. Prerequisite: Two years of orchestra participation.

**Mu 347 Instrumental Ensemble (1)**

Open to qualified musicians. Rehearsal and public performance in trios, quartets, quintets. Total credit limited to 6 units. 1 activity. Prerequisite: Permission of instructor.

**Mu 351 Band (1)**

Limited to those students who have had two years of band. The band plays for many college functions, assemblies, athletic games, and rallies, and makes at least one trip each year. Smaller groups are organized from the band for special functions. Total credit limited to 6 units. 1 laboratory. Prerequisite: Two years of band participation.

**Mu 352 University Winds (1)**

Study and public performance of music written for small wind ensemble (woodwinds, brass and percussion) from the sixteenth century to the present. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 354 Men's Glee Club (1)**

Study and performance of choral music composed for men's voices. The club performs several times on campus, including Home Concert, and sponsors an annual spring tour. Smaller specialty ensembles, vocal solos, and instrumental accompaniments afford further opportunities for members to develop their musical talents. Tryouts in fall only. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 355 University Singers (1)**

Study and public performance of chamber music for mixed voices from the sixteenth century to the present. Total credit limited to 6 units. 1 laboratory. Prerequisite: Permission of instructor.

**Mu 357 Women's Glee Club (1)**

Study and performance of choral music composed for women's voices. The club performs several times on campus, including Home Concert, and sponsors an annual spring tour. Smaller specialty ensembles, vocal solos, and instrumental accompaniments afford further opportunities for members to develop their musical talents. Tryouts in fall only. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 358 Choral Jazz Ensemble (1)**

Open to qualified singers and instrumentalists. Rehearsal and public performance of choral jazz. 1 laboratory. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 367 Vocal Ensemble (1)**

Open to qualified singers. Rehearsal and public performance of vocal music. 1 activity. Total credit limited to 6 units. Prerequisite: Permission of instructor.

**Mu 404, 405, 406 History of Music (3) (3) (3)**

Intensive study of a selected topic in music history each quarter through the use of readings, recordings, and scores. Prior completion of at least one quarter of music appreciation is recommended. 3 lectures.

**Mu 407 Form and Analysis (3)**

Intensive survey of musical forms from the 17th century to the 20th century. Analysis of musical structure, melodic invention and elaboration. 3 lectures. Prerequisite: Mus 303 or consent of instructor.

**Mu 436 Music Concepts (3)**

Creative approach to history, theory, appreciation, and criticism of music. Currently employed materials in the light of new musicological findings. Development of original musical themes utilizing scalar, chordic, and pentatonic approaches. 3 lectures. Prerequisite: Mu 301 or consent of instructor.

## **NATURAL RESOURCES MANAGEMENT**

**NRM 101 Introduction to Natural Resources Management (3)**

Natural resources of the United States: forests, minerals, water, wildland and wildlife. Development, management, and utilization of our natural resources for the continuous benefit of man and conservation of the resources. 3 lectures.

**NRM 112 Introduction to Parks and Recreation (3)**

Introduction to national, state, county, city and private park systems. History, policy and principles of the formation, administration and functioning of recreational units at the park, district and regional levels. 3 lectures.

**NRM 120 Introduction to Fisheries and Wildlife Management (3)**

Survey of fisheries and wildlife resources and management practices. Relationships to recreational values, land management, food production, and preservation. 3 lectures.

**NRM 130 Forest Resources (3)**

Fundamentals of forestry including basic silviculture, forest protection, and multiple use of forest lands for water production, forage, recreation, wildlife, and timber. 3 lectures.

**NRM 203 Resource Law Enforcement (3)**

Law enforcement applied to natural resource conservation. Development of laws; laws of arrest, search, and seizure; rules of evidence; court structure; and court procedures. Laws of parks, forestry, wildlife, and water quality control. 3 lectures.

**NRM 207 Resource Survey (3)**

Survey, inventory and assessment techniques used for evaluation of physical, biological and cultural resource features of a land area. Interpretation and correlation of geology, soils, topographic, climatic, vegetative and cultural maps. 2 lectures, 1 laboratory.

**NRM 210 Lake Management (4)**

Practices and management of recreational lakes to provide maximum use, to reduce aquatic pests, to provide necessary water quality, and to attract or produce aquatic animals associated with hunting and fishing preserves, farm ponds, and ornamental and recreational waters. 3 lectures, 1 laboratory. Prerequisite: NRM 120 or consent of instructor.

**NRM 230 Dendrology (4)**

Identification, classification, silvical characteristics, distribution, environmental requirements and economic importance of trees in parks, forest and wildlife areas of the United States. Emphasis on California species. 2 lectures, 2 two-hour laboratories. Prerequisite: Bot 123.



**NRM 232 Resource Fire Control (3)**

Fire behavior and effects; prevention, and control in the chaparral, grasslands, and wooded areas of forests, parks, and wildlands; fire danger measurement; prescribed use in management; policy and objectives. 3 lectures.

**NRM 302 Natural Resources Policy (3)**

Historical development and significance of natural resource policies including changing patterns between private and public enterprise and federal, state, and local government in resource management. 3 lectures. Prerequisite: NRM 130.

**NRM 304 Ecology of Resource Areas (4)**

Dynamics of environmental relationships in natural and developed resource areas, and the effects caused by man through his practices of preservation, recreation, and resource utilization. 3 lectures, 1 laboratory. Prerequisite: Bot 123, SS 121, or consent of instructor.

**NRM 311 Environmental Interpretation (3)**

Interpretation of the biological, physical and aesthetic values of the natural elements of our environment; organization and presentation of interpretive materials by oral, written, and display methods of communication. 2 lectures, 1 laboratory. Prerequisite: NRM 304, Bot 123, and Sp 200; or consent of instructor.

**NRM 312 Wildland Recreation (3)**

Types of wildlands, legal framework, and philosophies of management, special problems, illustrated with case studies. Concepts of recreational carrying capacity, with application in managing wildland. 3 lectures. Prerequisites: NRM 112 and NRM 304.

**NRM 320 Fishery Resource Management (4)**

Management of recreational and commercial fisheries to produce sustained annual crops of fishes. Survey, inventory, and evaluation techniques used for the management of a fishery. Methods of manipulating fish populations and the aquatic habitat. 3 lectures, 1 laboratory. Prerequisite: NRM 304.

**NRM 325 Wildlife Habitat Management (4)**

Habitat development, management and protection on land and water areas that support wildlife. Management of habitat occurring on agricultural lands, park and recreation lands, and wildlands. 3 lectures, 1 laboratory. Prerequisite: NRM 304.

**NRM 331 Fire Theory (3)**

Formulation and application of initial attack and suppression of fire, based on evaluation of fire conditions. 1 lecture, 2 laboratories. Prerequisite: NRM 232 or consent of instructor.

**NRM 332 Forest Products (4)**

Manufacturing and marketing of wood products, wood identification, study of wood structure and mechanical properties. 3 lectures, 1 laboratory. Prerequisite: Phys 121, NRM 130, 230.

**NRM 333 Forest Harvesting (4)**

Study relationships between forest production and harvesting methods, preparation of timber harvest plans, site preparation, harvesting effects, and cost analysis of harvesting methods. Field trip between winter and spring quarters to visit timber operations. 3 lectures and required field trip. Prerequisite: Junior standing in Forest Resource Management concentration or consent of instructor.

**NRM 334 Forest Mensuration (5)**

Methods and principles of measurement for contents of trees, stands and felled timber, construction and use of volume tables, use of statistical measures, and growth projection. 3 lectures, 2 laboratories. Saturday field trips required. Prerequisite: Math 115, Stat 212, and AE 238.

**NRM 336 Forest Protection (4)**

Impact and losses to forested areas caused by physical and biotic agents other than fire; relation of direct and indirect control practices to forest management. Saturday field trips required. 3 lectures, 1 laboratory. Prerequisite: NRM 304 or consent of instructor.

**NRM 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**NRM 401 Applied Resource Economics (3)**

Application of analytical economic methods to forest, marine, recreation, and wildlife resources development and utilization. Effect of time on rate of resource use; external effects of multiple uses of a common property resource; decision making involving multiple uses of a single resource system; recreation resource valuation in the absence of a market established price. 3 lectures. Prerequisite: Econ 211.

**NRM 403 Resource Law Methods (3)**

Problems, situations, and techniques in natural resource law enforcement. Patrol procedures; evidence collection and preservation; case presentation; human and public relations. 3 lectures. Prerequisite: NRM 203.

**NRM 405 Applied Resource Analysis (4)**

Evaluation of environmental responses to resource management programs; preparation, implementation, and coordination of environmental activities in terms of multiple-use management. Computer analysis techniques, applied interpretation of aerial photographs, standard measurement criteria, and interpretation of measurements. 3 lectures, 1 laboratory. Prerequisite: NRM 304, Stat 212.

**NRM 406 Natural Resources Administration (4)**

Administration of private and public resource units, including planning, budgeting, organizing, programming, staffing and maintaining the units. 3 lectures, 1 laboratory. Prerequisite: NRM 207 and senior standing.

**NRM 410 Water Oriented Recreation (4)**

Practices of management of water oriented outdoor recreation on private and public waters. Consideration of shoreline development, water surface time and space zoning, and underwater development. 3 lectures, 1 laboratory. Prerequisite: NRM 112 and NRM 304.

**NRM 411 Advanced Environmental Interpretation (3)**

Implementation of interpretive programs for parks, forests and other wildlands; program planning, organization, and development. Planning and operation of interpretive visitor centers. 2 lectures, 1 laboratory. Prerequisite: NRM 311.

**NRM 412 Site Development and Maintenance (4)**

Basic planning and design principles of selected outdoor recreation sites. Area layout, facility design, construction, and maintenance of structures, grounds, roads, and trails. 3 lectures, 1 laboratory. Prerequisite: NRM 207.

**NRM 417 Resource Planning (3)**

Development and analysis of resource plans. Types of plans, scheduling techniques, projecting supply and demand, application of models, and economic evaluations. Examples emphasize planning for parks and recreation. 3 lectures. Prerequisite: NRM 112.

**NRM 420 Culture of Warmwater Fishes (4)**

Management of a production fish hatchery. Facility design, water supply, quality, and control; production regimen; and process methods for warmwater game, food, and bait fishes. 3 lectures, 1 laboratory. Prerequisite: NRM 320.

**NRM 421 Culture of Coldwater Fishes (4)**

Propagation and production of trout, salmon, and other cold-water fishes. Site selection, design and operation of hatcheries; raceways and closed system production units. Spawning, feeding, harvesting, and transportation techniques used in the culture of coldwater fishes. 3 lectures, 1 laboratory. Prerequisite: NRM 320.

**NRM 424 Wildlife Preserve Management (3)**

Methods and principles for managing shooting and fishing preserves to provide quality sport hunting and fishing. Preserve construction, habitat manipulation, stocking, and regulations. Socio-economic considerations of preserve management. 3 lectures. Prerequisite: NRM 320 or NRM 325 or Cons 431.

**NRM 426 Resource Population Dynamics (3)**

Growth, fluctuations, balance, and natural mechanisms for control of wild animal populations. 3 lectures. Prerequisite: Stat 212, NRM 320 or 325.

**NRM 427 Marsh Management (4)**

Land, plant, and water management on wetlands to provide suitable habitat for wildlife. Techniques to minimize depredation of farm crops by wildlife. Regulation of multiple-use recreation on public and privately controlled wetlands. 3 lectures, 1 laboratory. Prerequisite: NRM 325.

**NRM 430 Silviculture (4)**

Interaction of forest and chaparral plant communities within the environment; influence of external factors upon wildlands, particularly those suited to outdoor recreation and wildlife production; growth and development of individual plants; origin, development, cultural practices and tolerance of forest and chaparral plant communities. Saturday field trips required. 3 lectures, 1 laboratory. Prerequisite: NRM 230.

**NRM 432 Community Forestry (3)**

Establishment and management of city forests, wood lots, small forest holdings, shelter belts, and plantings for erosion control, wildlife enhancement, and pollution abatement. Management of forest areas requiring special attention because of heavy recreational use. 2 lectures, 1 laboratory. Prerequisite: NRM 230.

**NRM 433 Forest Practices (4)**

Methods of organizing forest resources for sustained yield management; regulation of annual cut, determination of rotation and cutting cycles, and preparation of working plans. Saturday field trips required. 3 lectures, 1 laboratory. Prerequisite: NRM 334 and 430.

**NRM 435 Forest Valuation (3)**

Wildland and timber appraisal, wildland taxation. Financial and business aspects of forestry. Economic alternatives in addition to timber production. 3 lectures. Prerequisite: NRM 401, 430.

**NRM 440 Watershed Management (4)**

Principles and methods of management of chaparral, range, and forest land for optimum production and regulation of water yields and resource utilization and protection. 3 lectures, 1 laboratory. Saturday field trips required. Prerequisite: SS 121, and NRM 304 or Bio 325.

**NRM 441 Forest and Range Hydrology (4)**

Influence of forest and range vegetation on wildland water resources. Techniques of managing wildlands for increases in usable water yields. 3 lectures, 1 laboratory. Prerequisite: NRM 440.

**NRM 442 Watershed Protection (3)**

Introduction to watershed protection and rehabilitation; use of small structures and planting techniques. Analytical evaluation and prediction of watershed disturbances. Field trips required. 3 lectures. Prerequisites: NRM 440, AE 345.

**NRM 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**NRM 463 Undergraduate Seminar (2)**

Study and oral presentation of current developments and problems in the subject field. Discussion of recent findings and research and their application. 2 lectures.

**NRM 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**NRM 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**NRM 502 Resource Conservation (3)**

Conservation developments for broad treatment of land, water, mineral, forest, range, and wildlife resources. 3 lectures. Prerequisite: Graduate status and consent of instructor.

**NRM 570 Selected Topics in Natural Resources Management (1-3)**

Directed group study of selected topics for advanced students. Class schedule will list topic selected. Total credit limited to 9 units. 1 to 3 lectures. Prerequisite: Graduate standing and consent of instructor.

## **ORNAMENTAL HORTICULTURE**

**OH 101 Principles of Landscape Design I (3)**

Basic techniques and standards used in drafting for horticulture construction working drawings, landscape plans, sketching and perspective drawings by the industry. 1 lecture, 2 laboratories.

**OH 102 Principles of Landscape Design II (3)**

Basic principles of landscape design related to problem solving, plant composition and layout. Exposure to the design process. 1 lecture, 2 laboratories. Prerequisite: OH 101.

**OH 125 Commercial Floral Design Practices (3)**

Theory, techniques, and skills currently practiced in the floral design industry. Construction of basic floral products for resale, cut flower processing, industry sales practices, merchandising and packaging. 1 lecture, 2 laboratories.

**OH 126 Ornamental Horticulture Construction (2)**

Construction and repair of projects and equipment, using materials and methods unique to ornamental horticulture. Design and construction of simple irrigation systems related to the broad horticulture field. 1 lecture, 1 laboratory. Prerequisite: AE 121.

**OH 131, 132, 133 Fundamentals of Ornamental Horticulture (4) (4) (4)**

Ornamental horticulture as a career. Preview of nursery, floriculture and landscape industries. Discussion of student projects and project records. Commercial nursery operations and garden practices. Environment and plant growth. Basic floral design principles. Field trip required. 3 lectures, 1 laboratory. Prerequisite: Courses will be taken in sequence.

**OH 145 Bonsai Culture (2)**

Study of the philosophy, history, training, culture, production, and care of the Japanese Bonsai. 1 lecture, 1 activity.

**OH 152 Landscape Maintenance (3)**

Maintenance of trees, shrubs, ground covers, cultural requirements, irrigation, pruning, fertilizing. Repair of irrigation systems, equipment. Landscape maintenance industry. 2 lectures, 1 laboratory. Prerequisite: OH 126 or permission of instructor.

**OH 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**OH 225 Floriculture Grades and Standards (3)**

Grades and standards for cut flowers, potted plants, and other ornamentals. Use of score cards in evaluating florist crops. 1 lecture, 2 laboratories. Prerequisite: OH 131.

**OH 230 Ornamental Gardening (3)**

For non-horticulture majors. Information and recommendations for the home gardener. Methods of propagation, pruning, planting, soils, fertilizers, lawn planting and maintenance, pest and weed control, home landscaping, and identification and care of house plants. 2 lectures, 1 laboratory.

**OH 231, 232, 233 Plant Materials (4) (4) (4)**

Identification, habits of growth, cultural requirements, and use of ornamental woody and herbaceous plants used in the landscape of California. 3 lectures, 1 laboratory.

**OH 237, 238, 239 Landscape Plants I, II, III (3) (3) (3)**

Woody and herbaceous plants used in California landscaping. Identification, landscape uses, cultural requirements and growth habits of those plants best shown during the fall, winter, and spring. For non-horticulture majors. 2 lectures, 1 laboratory.

**OH 240 Principles of Greenhouse Environment (4)**

Analysis of problems and practices affecting the contemporary commercial horticulturist. Analysis and operation of greenhouses and related equipment stressing the effect of environment on plant growth. 3 lectures, 1 laboratory. Prerequisite: OH 131 and OH 132, or permission of instructor.

**OH 243 Turf Management (4)**

Turf propagation, irrigation, fertilizer and pest control methods and procedures. Turf grass varieties and uses. Turf equipment. 3 lectures, 1 laboratory.

**OH 251 Ikebana (3)**

Techniques of the ancient art of Ikebana as it influences western floral design. 2 lectures, 1 laboratory. Prerequisite: OH 125.

**OH 252 Continental Mass Design (3)**

Techniques of European and early American mass floral arranging as it influences western design of today. 2 lectures, 1 laboratory. Prerequisite: OH 251.

**OH 253 Stylized Western Design (3)**

Techniques of western stylized line design as it is known currently. 2 lectures, 1 laboratory. Prerequisite: OH 252.

**OH 320 Landscape Media (3)**

Various media essential to presentation of landscape design used in the industry. Basic techniques of design presentation involving plan, elevation, section and detail drawings, model construction and photography. Required field trip. 1 lecture, 2 laboratories. Prerequisite: OH 101, 102.

**OH 321 Residential Landscaping (4)**

Principles of landscape design for residential properties. Designing of several small home properties. 2 lectures, 2 laboratories. Prerequisite: OH 102, and two Plant Materials courses.

**OH 322 Advanced Landscape Design (4)**

Principles of landscape design of large scale properties and the application of these principles in solving of landscape design problems. 2 lectures, 2 laboratories. Prerequisite: OH 102, and two Plant Materials courses.

**OH 324 Tropical Plant Culture (4)**

Identification, culture, propagation, and ornamental use of tropical plants. 3 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

**OH 327 Diseases and Pests of Ornamental Plants (4)**

A detailed study of diseases and pests of ornamental plants, their effect on plants, their prevention and control. 3 lectures, 1 laboratory. Prerequisite: Ent 220 or CrSc 311, Bot 324.

**OH 328 Advanced Floral Design (4)**

Advanced styling of floral designs used in sympathy work; casket sprays, wreaths, hospital arrangements, and solid work. 2 lectures, 2 laboratories. Prerequisite: OH 125, 132, 253.

**OH 329 Advanced Floral Design (4)**

Advanced styling of floral designs to wear and carry, as practiced specifically in wedding work. Field trip required. 2 lectures, 2 laboratories. Prerequisite: OH 328.

**OH 330 Flower Arrangement (2)**

Principles and uses of flower arrangements as used in home and party decorating. 1 lecture, 1 laboratory. Prerequisite: Art 321 or HE 242 or consent of instructor.

**OH 331, 332 Landscape Contracting (4) (4)**

Practices in supervising men and applying approved techniques in landscape construction. Cost finding and estimating for landscape trades. Contract writing, accounting systems, and legal aspects of landscape contracting. 3 lectures, 1 laboratory. Prerequisite: OH 126, junior standing in the major curriculum and permission of instructor.

**OH 333 Advanced Turf Management (4)**

Maintenance and operation of large areas such as golf greens, athletic fields, and park areas. Systems of management and maintenance, business aspects, and turf industry. 3 lectures, 1 laboratory. Prerequisite: OH 243 or equivalent.

**OH 337 Park Planning and Management (4)**

Design, management and maintenance of private and public parks and recreational areas. 3 lectures, 1 laboratory. Prerequisite: OH 126, consent of instructor.

**OH 338 Advanced Plant Propagation (4)**

Advanced nursery and plant propagation practices. Grafting, dormant budding, seeding, lining out, balling out, bare rooting, and making hardwood cuttings. Construction and operation of forcing structures. 3 lectures, 1 laboratory. Prerequisite: OH 133.

**OH 341 Cut Flower Production (4)**

The production of cut flowers and foliage in the field, under cloth and under glass. Preparation of cut flowers and foliage for market. 3 lectures, 1 laboratory. Prerequisite: OH 240, SS 221 or permission or instructor.

**OH 342 Pot Plant Production (4)**

The production of major commercial potted plants under glass and lath. Preparation for sale and merchandising of greenhouse crops. 3 lectures, 1 laboratory. Prerequisite: OH 341 or permission of instructor.

**OH 381 Advanced Plant Materials (3)**

Recognition, identification, ecological significance, propagation, uses and landscape potential, environmental impact, and cultural needs of California Flora as they pertain to the horticultural field, and natural resource management. 2 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

**OH 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**OH 402 Garden Center Management (4)**

Legal aspects and economics of operating a commercial nursery and garden center and flower shop. State and county regulations, quarantines, grades and standards of nursery stock and floral design materials. Purchasing, merchandising and record keeping. Trade associations and cooperative buying. 3 lectures, 1 laboratory. Field trip required. Prerequisite: Econ 201 or 211, Actg 131, junior or senior standing, or permission of instructor.

**OH 410 Weed Control in Ornamental Plants (4)**

Weed impact and control in ornamental plants including weed identification and biology, control strategies and characteristics and use of herbicides. 3 lectures, 1 laboratory. Prerequisite: OH 133 or consent of instructor.

**OH 421 Arboriculture (4)**

The care and management of large ornamental trees. The use of ropes and other safety equipment in tree climbing. Cavity work, bracing, cabling, and pruning. 3 lectures, 1 laboratory. Prerequisite: OH 233, 327.

**OH 424 Container Plant Production (4)**

Commercial container plant nursery operations, including growing media, fertilization, weed control, container sizing, pruning and staking, systems analysis, production and inventory control, and marketing. 3 lectures, 1 laboratory. Prerequisite: OH 133, SS 221, senior standing, or permission of instructor.

**OH 425 Tissue Culture Propagation (2)**

Principles of tissue culture applied to the propagation of ornamental plants. Systems applicable to commercial crops, laboratory organization, media, and current research. 1 lecture, 1 activity. Prerequisite: Junior standing and consent of instructor.

**OH 426 Systematic Plant Problem Solving (2)**

Diagnosing plant disorders through systematic inquiry process. Oral examinations require students not only to identify plant disorders but effectively to determine how the problem evolved. 1 lecture, 1 laboratory. Prerequisites: senior standing, OH 327 and consent of the instructor.

**OH 443 Greenhouse Management (4)**

Problems and practices in the management of greenhouses. Scheduling greenhouse crops, planning crop rotation, management decisions in production costs and personnel matters. Field trip required. 3 lectures, 1 laboratory. Prerequisite: OH 342 or consent of instructor.

**OH 451, 452 Implementation of Landscape Design (2) (2)**

Planting design related to soils and fertilizers, disease and pest prevention, maintenance and growth factors. Landscape design and specification writing, estimating, installation. 2 laboratories. Prerequisite: Junior standing in Landscape Architecture or Ornamental Horticulture.

**OH 454 OH Irrigation Systems (4)**

Irrigation system design with emphasis on landscape, nursery and specialized systems, materials and installation. 2 lectures, 2 laboratories. Prerequisites: OH 101 (formerly OH 124) and AE 337.

**OH 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**OH 463 Undergraduate Seminar (2)**

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Each student is responsible for the development and presentation of a topic in his or her chosen field. 2 lectures. Prerequisite: A completed OH 462, senior project.

**OH 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**OH 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**OH 581 Graduate Seminar in Ornamental Horticulture (3)**

Group study of current problems of the ornamental horticulture industry; current experimental and research findings as applied to production and to the teaching of horticulture.

## **PHILOSOPHY**

**Phil 101 Introduction to Philosophy (3)**

A sampling of the problems, arguments, methods, and schools of philosophy. 3 lectures.

**Phil 221 Traditional Logic (3)**

The relation between logic and language. The nature, recognition, and avoidance of the common informal fallacies. Classical logic including immediate inferences, syllogisms, and enthymemes. 3 lectures.

**Phil 222 Modern Logic (3)**

Techniques of formal reasoning. Deductive techniques of propositional and predicate logic. 3 lectures.

**Phil 305 Western Religions (3)**

Judaism, Christianity, Islam. Beliefs, ethics, religious practices and history of Western and near Eastern world religions. 3 lectures.

**Phil 306 Eastern Religions (3)**

Religions and life-view philosophies of the Far East and India, including Buddhism, Hinduism, Taoism, Confucianism. Beliefs, ethics, religious practices of contemporary Far Eastern and Indian religions and significant historical developments leading to modern forms of these religions and philosophies of life. 3 lectures.

**Phil 307 Philosophy of Religion (3)**

Inquiry into the nature of religious experience and claims, naturalism and supernaturalism, arguments for the existence of God, the problem of evil, miracles, revelation, faith, human nature and destiny, verification and refutation of religious claims. 3 lectures.

**Phil 311 History of Greek Philosophy (3)**

Beginnings of Western science and philosophy. Pre-Socrates, Socrates, Plato, and Aristotle. Greek philosophies in the Roman world. 3 lectures.

**Phil 312 History of Medieval Philosophy (3)**

Main developments of Western philosophy from Augustine to Occam, especially the philosophies of Anselm, Abelard, Roger Bacon, Bonaventure, and Aquinas. 3 lectures.

**Phil 313 History of Modern Philosophy (3)**

Development of Western philosophy from the Renaissance period through Hume with emphasis upon the philosophies of the Continental Rationalists and the British Empiricists. 3 lectures.



**Phil 315 Contemporary Philosophy (3)**

Contemporary answers to perennial philosophical questions regarding man, the universe, and their relationships. Representative examples from the major contributors to the new movements in philosophy: Existentialism, Phenomenology, Logical Positivism, Analytic Philosophy, and Pragmatism. 3 lectures.

**Phil 321 Philosophy of Science (3)**

The methods of physics, biology, psychology and other selected sciences, with reference to their presuppositions and general findings. Relations between the sciences and implications of scientific methods for other fields of inquiry. 3 lectures.

**Phil 322 Symbolic Logic (3)**

Introduction to the techniques of formal reasoning. Propositional and predicate logic, predicate logic with identity and definite descriptions. Metalogical foundations of modern symbolic logic. 3 lectures. Prerequisite: Phil 221 or 222.

**Phil 331 Ethics (3)**

Inquiry into the problems of the principles of right action and justice, of moral character and motivation, and of the good life. Examination of traditional and contemporary answers to these problems and the implications of those answers. 3 lectures.

**Phil 333 Political Philosophy (3)**

Philosophic foundation of political ideologies. Freedom, state, law, obligation, sanction, and their relation to metaphysics, theory of knowledge, and ethics. 3 lectures.

# PHYSICAL EDUCATION

## Number Fields for Physical Education Courses

	Coed (PE)	Men (PEM)	Women (PEW)
General Activities.....	100-165		
Intramural activities.....	174	175	176
Competitive athletics .....	181-199	181-199	181-199
Professional activities (PE majors or related option students only) .....	206-239		
Academic courses .....	240 up		

### General Activities

Enrollment is open to all students except for designated intramural courses. Courses satisfy the general education breadth requirement, carry 1 unit of credit, meet 2 hours per week, and are designed to develop skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in sports.

The beginning course or its equivalent is prerequisite to the intermediate, and the intermediate to the advanced. Prerequisite may be waived by consent of the instructor.

Students not majoring in physical education may apply a maximum of 12 units of credit earned in general and intramural activity courses toward the bachelor's degree.

All general activity courses (PE 100-199) are evaluated on a Credit/No Credit basis.

### Coed

PE 100 Adaptive Activity	PE 130 Orienteering
PE 101 Apparatus, Beg.	PE 131 Physical Conditioning
PE 102 Apparatus, Int.—Adv.	PE 132 Racquetball, Beg.
PE 103 Archery	PE 133 Racquetball, Int.—Adv.
PE 104 Badminton, Beg.	PE 136 Skin-Scuba Diving
PE 105 Badminton, Int.—Adv.	PE 137 Self-Defense
PE 106 Ballet, Beg.	PE 138 Rugby
PE 107 Ballet, Int.—Adv.	PE 139 Soccer, Beg.
PE 108 Basketball	PE 140 Soccer, Int.—Adv.
PE 109 Bowling	PE 141 Social Dance
PE 110 Cycling	PE 142 Softball, Adv.
PE 111 Fencing, Beg.	PE 143 Life Saving, Adv.
PE 112 Fencing, Int.—Adv.	PE 144 Swimming, Beg.
PE 114 Field Hockey, Beg.	PE 145 Swimming, Int.
PE 115 Field Hockey, Int.—Adv.	PE 146 Swimming, Adv.
PE 116 Figure Control	PE 147 Team Handball
PE 117 Flag Football	PE 148 Tennis, Beg.
PE 118 Folk Dance	PE 149 Tennis, Int.—Adv.
PE 119 Handball, Beg.	PE 150 Tumbling-Trampoline
PE 120 Handball, Int.—Adv.	PE 151 Volleyball, Beg.
PE 121 Golf, Beg.	PE 152 Volleyball, Int.—Adv.
PE 122 Golf, Int.—Adv.	PE 153 Water Polo
PE 123 Jazz Dance, Beg.	PE 154 Weight Training
PE 124 Jazz Dance, Int.—Adv.	PE 156 Aqua-Calisthenics
PE 125 Jogging	PE 158 Synch. Swimming
PE 126 Judo	PE 159 Wrestling
PE 127 Modern Dance, Beg.—Adv.	PE 174 Coed Intramurals
PE 128 Modern Dance, Int.	PEM 175 Men's Intramurals
PE 129 Hatha Yoga	PEW 176 Women's Intramurals

## Competitive Athletics

Enrollment limited to those qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 1 unit and meet for a minimum of 10 hours per week.

Coed		Men		Women	
PE 181	Fencing.....	PEM 182	Baseball		
		PEM 183	Basketball	PEW 183	Basketball
		PEM 184	Cross Country	PEW 184	Cross Country
		PEM 185	Football		
		PEM 186	Golf		
				PEW 187	Gymnastics
		PEM 188	Rugby		
		PEM 189	Soccer		
				PEW 190	Softball
		PEM 191	Swimming	PEW 191	Swimming
		PEM 192	Tennis	PEW 192	Tennis
		PEM 193	Track and Field	PEW 193	Track and Field
		PEM 194	Volleyball	PEW 194	Volleyball
		PEM 195	Water Polo		
		PEM 196	Wrestling		

## Professional Activities

Enrollment limited to those pursuing a major in the Physical Education Department. Physical Education majors may apply a maximum of 24 units of credit earned in PE 101-239 toward the bachelor's degree. Course selection is determined by the student's advisor and on the basis of activity proficiency. All courses are one or two units and meet for two or four hours per week. All professional activities are coed and are designed to develop skills, knowledge of rules, strategy and analysis. Students are expected to reach at least an intermediate skill level upon completion of this series. Prerequisites in the 101-165 series activities will be required for those students who cannot demonstrate minimum skill levels.

PE 206	Tumbling-Trampoline-Vaulting (2)	PE 216	Wrestling (1)
PE 207	Apparatus (2)	PE 217	Football (1)
PE 208	Golf (1)	PE 218	Aquatics (2)
PE 210	Tennis (1)	PE 221	Combatives/Self Defense (1)
PE 211	Softball-Baseball (1)	PE 222	Archery (1)
PE 212	Handball/Racquetball (1)	PE 223	Cross Country and Track Events (1)
PE 213	Basketball (1)	PE 224	Field Events (1)
PE 214	Volleyball (1)	PE 225	Team Handball (1)
PE 215	Field Sports (Soccer, Speedball, Speed-away) (2)	PE 226	Field Hockey (1)
		PE 229	Badminton (1)

## Academic Courses

Professional courses designed primarily for the student majoring in physical education. Course 250 may be used in partial satisfaction of the General Education Breadth requirement in physical education

### PE 240 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or other selected problems. Total credit limited to 4 units with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

### PE 244 Introduction to Dance (3)

Dance fundamentals, movement, elements of music, rhythmic analysis and their relationship to dance. Introduction of all types of dance and brief history and philosophy. Limited to Physical Education and Recreation Administration majors. 1 lecture, 2 two-hour laboratories.

**PE 250 Health Education (2)**

An introductory health course geared to bridge the gap between scientific health discoveries and one's application of these discoveries in the daily living pattern. 1 lecture, 1 recitation.

**PE 252 Beginning Athletic Training (2)**

Modern principles and practices in the prevention, treatment, rehabilitation and follow-up care of athletic injuries. Functions and limitations of the athletic trainer as an athletic paramedic. Theory and practice of adhesive strapping as related to supporting major body joints for athletic participation. 2 two-hour activities. Prerequisite: Zoo 131.

**PE 254 School Health Program (2)**

Introduction to school health services, instruction, and environment within the public and private school system. 2 lectures.

**PE 260 Intramural Sports (3)**

Principles and policies underlying programs of intramural sports in secondary schools and community centers. 2 lectures, 1 two-hour laboratory.

**PE 270 Introduction to Physical Education (2)**

Designed to acquaint the student with concept of Physical Education as a profession and to orient the student to the Cal Poly program. 2 lectures.

**PE 274 History and Philosophy of Physical Education (3)**

History of physical education including philosophical, institutional, and personal influences. Application of education principles to physical education. 3 lectures.

**PE 278 Officiating Football (1)**

Rules interpretation and techniques of officiating football. 1 two-hour laboratory.

**PE 280 Safety and First Aid (2)**

A standard American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 1 lecture, 1 two-hour laboratory.

**PE 284 Water Safety (1)**

Review of life saving skills, analysis of swim strokes and techniques, teaching experience. Upon successful course completion, students are eligible for examination for a Red Cross W.S.I. card. Curriculum requirements can be satisfied even though card requirements are not fulfilled. 2 one and one-half hour laboratories. Prerequisite: Current life saving card.

**PE 290 Officiating Basketball (1)**

Rules interpretation and officiating of women's basketball. 1 two-hour laboratory.

**PE 292 Officiating Gymnastics (1)**

Development of judging technique in gymnastics. 1 two-hour laboratory.

**PE 294 Officiating Track & Field (1)**

Rules interpretation and officiating track and field events. 1 two-hour laboratory.

**PE 296 Planning Techniques in Physical Education (3)**

Practical skills and techniques of teaching physical education in schools. Unit and lesson planning and organizing, class management and procedure, teaching aids, evaluation skills. 2 lectures, 1 two-hour laboratory.

**PE 297 Officiating Volleyball (1)**

Rules interpretation and officiating of volleyball. 1 two-hour laboratory.

**PE 298 Officiating Baseball and Softball (1)**

Rule interpretations in officiating baseball and softball. 2 one-hour activities. Prerequisite: PE 211 or permission of instructor.

**PE 302 Kinesiology (3)**

Science of human movement integrating both structural and functional aspects. Anatomy, physiology, and elementary mechanics in relation to movement in sports, work, and the activities of daily living. 2 lectures, 1 two-hour laboratory. Prerequisite: Zoo 237 and 340.

**PE 303 Physiology of Exercise (3)**

Application of the knowledge of human physiology to exercise situations. 2 lectures, 1 two-hour laboratory. Prerequisite: Zoo 238, 239.

**PE 305 Drug Education (2)**

Instruction on the nature and effect of the use of tobacco, alcohol, narcotics and restrictive dangerous drugs. 2 lectures.

**PE 312 Teaching and Coaching Swimming and Water Polo (3)**

Supervision of swimming pool activities. Teaching and coaching swimming and water polo. 2 lectures, 1 two-hour laboratory.

**PE 319 Tests and Measurements in Physical Education (3)**

Physical tests and measurements of skill, strength, speed, and endurance as a basis for grading and as a measure of progress in activities. 2 lectures, 1 two-hour laboratory. Prerequisite: Stat 211 and 212.

**PE 321 Coaching Football (2)**

Fundamentals and systems of offensive and defensive football. Preparation for interscholastic coaching. Rules of the game. 1 lecture, 1 two-hour laboratory. Prerequisite: PE 217 or permission of instructor.

**PE 322 Coaching Basketball (2)**

Theories of coaching, principles of organization of interscholastic basketball. 1 lecture, 1 two-hour laboratory. Prerequisite: PE 213 or permission of instructor.

**PE 323 Baseball Coaching Theory and Practice (2)**

Fundamentals of baseball with emphasis on strategy, selection of players, officiating, interpretation of rules, scoring, and administration of interschool games. 1 lecture, 1 two-hour laboratory.

**PE 327 Coaching Wrestling (2)**

Coaching techniques of wrestling. Theories of coaching principles and organization of interscholastic wrestling. 1 lecture, 1 two-hour laboratory. Prerequisite: PE 216 or permission of instructor.

**PE 332 Elementary School Physical Education (3)**

Prepares the student to guide elementary school age children through a well-balanced program in physical education. Aims, objectives, procedures, methods, evaluation and program planning. 1 lecture, 2 two-hour laboratories.

**PE 344 Coaching Power Volleyball (2)**

Techniques and theories of individual fundamentals, game strategies, and problems of coaching secondary and collegiate level athletes. 1 lecture, 1 two-hour laboratory.

**PE 356 Teaching and Coaching Women's Gymnastics (4)**

Techniques and problems in teaching women's gymnastics. Practical experience in organizing interscholastic women's gymnastics. Theories of coaching principles and analysis of stunts. 2 lectures, 2 two-hour laboratories. Prerequisite: PE 206, 207, or permission of instructor, and PE 296.

**PE 358 Teaching and Coaching Men's Gymnastics (4)**

Techniques and problems in teaching men's gymnastics. Practical experience in organizing interscholastic men's gymnastics. Theories of coaching principles and analysis of sports. 2 lectures, 2 two-hour laboratories. Prerequisite: PE 206, 207 or permission of instructor and PE 296.

**PE 375 Teaching Team and Individual Sports (3)**

Techniques in teaching team and individual sports such as archery, tennis, volleyball, golf and field sports. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 208, 210, 211, 214, 222 and 296 or permission of the instructor.

**PE 379 Teaching Track and Field and Cross Country (3)**

Techniques and problems in teaching track and field and cross country. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 223, 224, and 296.

**PE 381 Recreational Dance Theory (3)**

Development of teaching techniques, methods, curricular materials and evaluation procedures as related to the teaching of folk, social and square dance. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 244, 296.

**PE 383 Modern Dance Theory (3)**

Development of teaching techniques, methods, curricular materials and evaluation procedures as related to the teaching of modern dance in the elementary and secondary schools. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 244, 296.

**PE 385 Choreography (3)**

Problems connected with dance composition and choreography. Total credit limited to 6 units. 1 lecture, 2 two-hour laboratories. Prerequisite: One year dance experience or consent of instructor.

**PE 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or permission of the instructor.

**PE 401 Organization and Administration of Health and Physical Education (3)**

Underlying philosophy, principles, policies, and procedures of administration as applied to health and physical education. Legal aspects and the interrelationships with the general school curriculum at the local, state, and national levels. 3 lectures.

**PE 405 Administration of Health Education (2)**

Current procedures and policies in curriculum development and basic administration of health education programs. 2 lectures.

**PE 406 Adaptive Physical Education (3)**

Growth and development patterns; their relation to special and regular physical education programs. Analysis of postural divergence and procedures for prevention and correction. 2 lectures, 1 two-hour laboratory. Prerequisite: PE 302, 303.

**PE 410 Psychology of Coaching (3)**

Psychological consideration of the coach-athlete relationship. Mental preparation of teams and individuals for competition. 3 lectures. Prerequisite: Senior standing.

**PE 424 Organizing and Teaching Physical Education (3)**

Organization, selection, presentation, application, and interpretation of subject matter in physical education. 3 lectures. Prerequisite: Permission of instructor.

**PE 432 Athletic Training and Rehabilitation (2)**

Modern principles and practices in conditioning and care of athletes. Theory and practice in the scientific manipulation of the muscles as related to therapeutic exercise. 2 two-hour laboratories. Prerequisite: PE 252.

**PE 437 Directed Field Work (1-3)**

Practical work experience in related phases of physical education under qualified supervision. Total credit limited to 9 units. Minimum of 2 laboratory hours per week per unit. Prerequisite: Senior standing or permission of advisor.

**PE 440 Activity Supervision (1)**

Required of physical education majors enrolled in the teaching option. Emphasis will be given to class organization of required physical education classes. Total credit limited to 3 units. 2 one-hour periods. Prerequisite: Senior standing and 300-level methods courses.

**PE 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: PE 302, 303, 319 or advisor approval.

**PE 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

**PE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: PE 517 and consent of department head, graduate adviser, and supervising faculty member.

**PE 502 Seminar in Problems of Physical Education (3)**

Practical problems in physical education and their solution in terms of desired objectives in this field. 3 lectures.

**PE 511 Administration of Physical Education (3)**

Principles and techniques of administration of physical education on the elementary and secondary school levels. 3 lectures.

**PE 512 Critical Health Issues (3)**

Contemporary health issues and related information. Adaptability of scientific health discoveries to current patterns of living. 3 lectures.

**PE 513 Evaluation of Current Studies (3)**

Analysis and evaluation of published studies in physical education, health education and recreation. 3 lectures. Prerequisite: PE 517.

**PE 516 Physical Education Facilities, Equipment and Finance (3)**

Design and construction of physical education facilities. Budgeting and financing physical education, intramural, and athletic facilities and programs. 3 lectures. Prerequisite: Graduate standing.

**PE 517 Research Methods in Physical Education (3)**

Experimental, descriptive, historical, philosophical, and action research in physical education. Selection of adequate problems for investigation; various sampling techniques and analyses; use of library facilities; manuscript requirements for the thesis. 3 lectures. Prerequisite: PE 319 or consent of the instructor.

**PE 522 Mechanical Analysis of Sports (3)**

Application of principles of body mechanics to physical education and sports activities as a basis for analyzing and improving motor performance. 3 lectures. Prerequisite: PE 302, 303, consent of instructor.

**PE 525 Motor Learning (3)**

Analysis of research principles and concepts of motor performance and learning directed toward psychology of teaching and coaching. 3 lectures.

**PE 526 Sport in American Society (3)**

Understanding the role of sport in American society as viewed from sociological and psychological perspectives. Effect of success and failure in competitive sport situations. 3 lectures.

**PE 530 Advanced Physiology of Exercise (3)**

Effects of exercise on human beings in relation to performance and physiological adjustment to activity. 3 lectures. Prerequisite: PE 303.

**PE 535 Administration of Athletics (3)**

Responsibilities and administrative concerns of athletic directors. Philosophy and ethics, budget and finance, equipment and supplies, legal liability, public relations, planning and maintenance of facilities, health aspects of athletics, and responsibilities to students. 3 lectures.

**PE 581 Graduate Seminar in Physical Education (1-3)**

Directed group study of selected topics for advanced students. Class schedule will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Graduate standing or consent of instructor.

**PE 599 Thesis (2) (2) (2)**

Independent research under the guidance and supervision of the staff. Prerequisite: PE 517, consent of graduate adviser and supervising faculty member.

## **PHYSICAL SCIENCE**

**PSc 101 The Physical Environment: Matter and Energy (4)**

Introduction to the basic principles of physical science and application of these principles in modern society. Objects at rest and in motion, energy and power, fluids, heat, light, and sound. 3 lectures, 1 recitation.

**PSc 102 The Physical Environment: Atoms and Molecules (4)**

Introduction to the basic principles of the atomic, molecular, and sub-atomic behavior of matter, and applications of these principles in modern society. Electricity and magnetism, electrical nature of matter, organic and inorganic chemistry, modern physics, the nucleus. 3 lectures, 1 recitation. Prerequisite: PSc 101.

**PSc 103 The Physical Environment: Earth and the Universe (4)**

Introduction to the basic principles of the earth sciences and astronomy, and applications of these principles in modern society. Structure and formation of the earth, earthquakes, weather, oceanography, solar system, stars, and cosmology. 3 lectures, 1 recitation. Prerequisite: PSc 101.

**PSc 171 Science and Society (3)**

Interdisciplinary approach to contemporary science-society issues. Three 3-week periods, each conducted by a professor from a different scientific discipline. 3 lectures.

**PSc 201 Introduction to Physical Oceanography (3)**

Origin, extent of oceans; nature of sea bottom, sediments. Causes, effects of ocean circulation, tides and waves. Physical properties of sea water. Transmission of heat, sound and light. Shorelines and shoreline processes. One or two field trips. Not open to students with credit in PSc 301. 3 lectures.

**PSc 301 Physical Oceanography (3)**

Oceanic regions, waves, mechanics and dynamics of currents, Earth's heat budget, ocean margins, influence of biological and chemical processes, man's interaction with the ocean, measurements, problems of special interest. Not open to students with credit in PSc 201. 3 lectures. Prerequisite: Physics 122 or 132 and a course in calculus.

**PSc 303 Earth and Space Science (4)**

Concept oriented treatment of astronomy and space science, geology, oceanography, atmospheric physics, and meteorology designed for prospective elementary teachers. 2 lectures, 1 recitation, 1 activity. Prerequisite: PSc 101 and 102 and consent of instructor.



**PSc 424 Organizing and Teaching of Physical Sciences (3)**

Techniques, aims and objectives in the teaching of physical sciences and general sciences at the secondary level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: Evidence of satisfactory preparation in physics and chemistry.

**PSc 436 Demonstration Experiments in Physical Science (1)**

Investigation and illustration of the principles of physical science through demonstration experiments, designed and assembled by students according to their background and interest, largely from inexpensive, easily obtainable materials. Total credit limited to 2 units. 1 activity. Prerequisite: 6 quarter units of physical science.

**PSc 461 Senior Project (2)**

Selection and completion of a project under faculty supervision. Project results are presented in a formal report. Minimum of 60 hours total time.

## **PHYSICS**

**Phys 100 Introduction to Physics (1)**

Introduction to the professional work of the physicist. Content and methods of physics. Orientation to the resources and objectives of the Physics Department. Offered only on a credit-no credit basis. Open to physics and physical science majors only. 1 lecture.

**Phys 104 Introductory Physics (4)**

Fundamental principles of mechanics, heat, light and electricity. Not to be taken by students who have taken a college course in Physics. 4 lectures. Prerequisite: Math 103 or 114 or 120.

**Phys 110 Energy for the Future (3)**

Detailed presentation of current and future sources of energy. Nuclear fission, nuclear fusion, geothermal energy, and solar energy. Physical principles, problems, current research, and future prospects. 3 lectures.

**Phys 121, 122, 123 College Physics (4) (4) (4)**

Fundamental principles of mechanics; hydraulics, heat, light and sound; magnetism, electrostatics, current electricity, atomic and nuclear physics. Not open to students who have previously taken corresponding college courses in physics. 3 lectures, 1 laboratory. Prerequisite: Math 115 or 120.

**Phys 131 General Physics (4)**

Fundamental principles of mechanics: vectors, particle kinematics, statics and dynamics, equilibrium of a rigid body, work and energy, linear momentum. Primarily for physical science, engineering, and architecture students. 3 lectures, 1 laboratory. Prerequisite: Math 131 or concurrent enrollment in Math 142.

**Phys 132 General Physics (4)**

Rotational kinematics and dynamics, oscillations, waves in elastic media, sound waves, temperature, heat and the first law of thermodynamics, kinetic theory of matter, second law of thermodynamics. 3 lectures, 1 laboratory. Prerequisite: Phys 131.

**Phys 133 General Physics (4)**

Charge and matter, electric field, electric potential, dielectrics, capacitance, current and resistance, electromotive force and circuits, magnetic fields, magnetic field of a moving charge, induced emf, geometric and wave properties of light. 3 lectures, 1 laboratory. Prerequisite: Phys 131, Math 132 or 143.

**Phys 134 General Physics (3)**

Magnetic properties of matter, Maxwell's equations, electromagnetic waves, radiation, physical optics. 3 lectures. Prerequisite: Phys 133 or EL 207.

**Phys 137 General Physics: Applied Physics for Architects (4)**

Applied physics problems related to architecture including: damped, forced, and coupled oscillations in mechanical structures and electric circuits; earthquakes and structures; elementary electric circuit and wiring concepts; energy transport and efficient use of energy in buildings. For School of Architecture and Environmental Design majors. 3 lectures, 1 laboratory. Prerequisite: Phys 132, Math 142.

**Phys 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**Phys 206, 207 Instrumentation in Experimental Physics (2) (2)**

Electrical and electronic circuit elements, operational amplifiers, and digital techniques including logic, counting, and analog-digital converters with applications to instrumentation in modern physics. 2 lectures. Prerequisite: Phys 133, Math 143, and concurrent enrollment in Phys 256, 257.

**Phys 210 Introduction to Modern Physics (4)**

Fundamental principles of modern physics, emphasizing atomic and nuclear phenomena. Introduction to special relativity, wave particle duality, Bohr theory, radioactivity, interaction of radiation with matter, and nuclear reactions. 4 lectures. Prerequisite: Phys 133 or EL 207 or Phys 123 and Math 132. Not open to students who have taken Phys 211.

**Phys 211 Modern Physics (4)**

Fundamental principles of modern physics, emphasizing atomic and quantum phenomena. Introduction to special relativity; wave-particle duality; Bohr theory; Schrodinger equation; elementary atomic structure. 4 lectures. Prerequisite: Phys 133 or EL 207 or equivalent, Math 133 or 241.

**Phys 213 Introduction to Nuclear Physics (3)**

Nuclear radiations and interactions. Detection methods, instruments and radioactive hazards. Nuclear reactions and induced radioactivity. Nuclear energy. 3 lectures. Prerequisite: Phys 211.

**Phys 243 Introductory Nuclear Physics Laboratory (1)**

Techniques of nuclear radiation detection and measurement including Geiger, proportional and scintillation counting. Properties of alpha, beta and gamma radiation. 1 laboratory. Prerequisite or concurrent: Phys 210 or 213, Phys 256 or equivalent.

**Phys 256, 257 Electrical Measurements Laboratory (1) (1)**

Experimental studies of circuit analysis and electronics; introduction to digital techniques; instrumentation. 1 laboratory. Prerequisite: Phys 133, Math 143.

**Phys 301 Heat (3)**

Thermodynamics and statistical mechanics. Entropy, temperature, chemical potential, free energy. Selected applications including paramagnetism, ideal gas, Fermi-Dirac distribution. 3 lectures. Prerequisite: Phys 210 or 211, Math 241.

**Phys 302 Analytic Mechanics (3)**

Vector analysis, statics of particles and rigid bodies, uniform and parabolic catenary, laws of motion, kinematics and dynamics of a particle. Work and energy. Particle in uniform field. Oscillatory motion (damped and forced oscillation). Center of mass. Linear and angular momentum. 3 lectures. Prerequisite: Phys 131, Math 242.

**Phys 303 Analytic Mechanics (3)**

Dynamics of a rigid body, central force motion, accelerated reference frames. Three-dimensional motion of a rigid body, introduction to Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: Phys 302, concurrent Math 304.

**Phys 310 Physics of Energy (3)**

Physics and mathematics applied to broad energy topics. Conservation, transportation, solar energy, nuclear fission, breeder reactors, plasma fusion, laser fusion and separation, hydrogen economy, fuel cells, wind wave, tidal, and geothermal energy, transmission, storage, fossils, magnetohydrodynamic generators, and national planning. 3 lectures. Prerequisite: Phys 133.

**Phys 313 Introduction to Atmospheric Physics (3)**

Properties of the atmosphere. Atmospheric motions. Solar and terrestrial radiation; atmospheric scattering, optics, elements of radiative heat transfer and cloud physics. Description of the upper atmosphere. 3 lectures. Prerequisite: Physics 132 or 122 and Math 143 or 133 or equivalent.

**Phys 315 Introduction to Lasers and Laser Applications (3)**

Interaction of radiation with matter, theory of laser action, characteristics and modification of laser output, types of lasers. Holography and other applications. 3 lectures. Prerequisites: Phys 133 or EL 207 or equivalent, or Phys 123 with Math 133 or Math 143.

**Phys 317 The Special Theory of Relativity (3)**

Fundamental experiments and basic postulates of special relativity. Simultaneity, length and time measurements. Lorentz transformations. Four-Vectors. Space-time diagrams. Relativistic mechanics and electromagnetism. 3 lectures. Prerequisite: Phys 210 or 211.

**Phys 323 Physical Optics (4)**

Survey of geometrical optics. Interference, Fraunhofer diffraction, Fresnel diffraction, polarization. Selected topics in modern optics. 3 lectures, 1 laboratory. Prerequisite: Phys 134, 210 or 211, Math 241, or consent of the instructor.

**Phys 341, 342 Quantum Physics Laboratory (1) (2)**

Experimental studies of particles and radiation, their quantum properties and interactions with atoms and nuclei. 1 laboratory (341), 2 laboratories (342). Prerequisite: Phys 243.

**Phys 363 Undergraduate Seminar (2)**

Study and oral presentation of current developments in physics. Discussion of projects and research by students and faculty. 2 meetings.

**Phys 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

**Phys 403 Nuclear Physics (3)**

Nuclear reactions. Structure of the nucleus. Nuclear energy levels. Radioactive decay processes. Nuclear fission. Nuclear spin and magnetic moment. Elementary particles. 3 lectures. Prerequisite: Phys 213, 405.

**Phys 405 Quantum Mechanics (3)**

The wave nature of matter. The wave function and its interpretation. The Schrodinger equation. Solutions for one dimensional problems and the one electron atom. 3 lectures. Prerequisite: Phys 211; Math 242. Recommend: Math 304.

**Phys 406 Solid State Physics (3)**

Crystalline structure of solids. Vibrational and electronic energies in the crystal lattice. Electrical, thermal, and magnetic properties of metals, insulators, and semi-conductors. 3 lectures. Prerequisite: Phys 405.

**Phys 407 Quantum Mechanics (3)**

Electron spin and Pauli spin matrices. Matrix mechanics. Total angular momentum. Perturbation theory. Radiative transitions. Identical particles. 3 lectures. Prerequisite: Phys 405.

**Phys 408, 409 Electromagnetic Fields and Waves (4) (3)**

Electric and magnetic field theory using vector analysis. Electric fields, dielectric materials, magnetic fields, induced emf's, magnetic materials, Maxwell's equations, wave equations, plane electromagnetic waves. Dipole radiation, radiation from an accelerated charge. 4 lectures, 3 lectures. Prerequisite: Phys 134, Math 304.

**Phys 410 Physics of the Solid Earth (3)**

Gravity and the figure of the earth. Body wave seismology, structure and composition of the earth, heat flow and heat sources, earth tides, rotational dynamics, the geomagnetic field and its source, paleomagnetism. 3 lectures. Prerequisite: Phys 133 and Math 242 or equivalent.

**Phys 412 Solid State Physics for Engineers (3)**

Basic quantum mechanics. Application to atomic structure and bonding. Crystal structures and their determination. Elementary treatments of Fermi statistics, free electron theory and band theory of solids, bulk properties of metals and semi-conductors. Application to optical properties of solids and to selected current topics of interest (lasers, superconductivity, etc.). 3 lectures. Prerequisite: Phys 211.

**Phys 413 Advanced Topics in Solid State Physics (3)**

Lattice dynamics, tunable lasers, non-linear optics, band theory, transport phenomena. Properties of superfluids and conductors, current experimental techniques. Review of the present state of the art from journal articles. 3 lectures. Prerequisite: Phys 406, 412, or consent of instructor.

**Phys 416 Theoretical Acoustics (3)**

Mathematics-based theoretical treatment of vibrations and normal modes; wave equation and solutions; radiation from vibrating sources, resonators and filters; impedance; decibel scale; speech, hearing and psychological acoustics. 3 lectures. Prerequisite: Phys 132 and Math 318.

**Phys 421 Nuclear Reactor Physics (4)**

Nuclear fission. Nuclear chain reaction. Neutron diffusion. Thermal reactor critical equation. Time varying system. Reactor control and factors affecting multiplication. 3 lectures, 1 laboratory. Prerequisite: Phys 243, Math 242.

**Phys 452 Solid State Physics Laboratory for Engineers (1)**

Selected experiments on the solid state of matter using electrical, optical, and x-ray methods. 1 laboratory. Prerequisite or concurrent: Phys 412

**Phys 456 Solid State Physics Laboratory (1)**

Experimental study of the solid state of matter using X-ray, electrical and optical methods. 1 laboratory. Prerequisite or concurrent: Phys 406. Prerequisite: Phys 341 or consent of instructor.

**Phys 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**Phys 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Phys 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

## POLITICAL SCIENCE

### Pol Sc 099 U.S. History and Government (3)

Basic structure and operation of the federal government. The constitution as a modern regulatory instrument; bases of American ideals. Function of state and local government. This course may not be substituted for Hist 204, 205, Pol Sc 201 or 401. 3 lectures. Not open to degree students for degree credit.

### Pol Sc 100 Introduction to Political Science (3)

Introduction to the scope, language, concepts and approaches of the discipline of political science. Career opportunities. 3 lectures.

### Pol Sc 101, 102 National and California Government (3) (3)

Governmental institutions of the United States. California state and local political institutions and problems. Completion of Pol Sc 101 and 102 will satisfy the California state requirements in the United States Constitution, state and local government. 3 lectures.

### Pol Sc 105 Introduction to International Relations (3)

Introduction to dynamics, character and substance of power relations among nations; conflict and accommodation, including the nature of the state and the international community. 3 lectures.

### Pol Sc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

### Pol Sc 201 American Government (3)

The origin, nature, and distribution of political power. Declaration of Independence. The Constitution of the United States. Function and current problems of national, state and local government. Finding and evaluating authoritative source materials on political affairs. Not open to students with credit in or enrolled in Pol Sc 101. 3 lectures.

### Pol Sc 202 Comparative Politics (3)

Comparative study of the government of the United Kingdom and other selected Western European countries. 3 lectures. Prerequisite: Pol Sc 101 or 201.

### Pol Sc 203 Basic Political Analysis (5)

An introduction to methodology research design and quantitative methods used in survey research and political analysis. Bi-variate inferential statistics and elementary computer programming in SPSS will be used to analyze political phenomena. 3 lectures, 2 labs. Prerequisite: Pol Sc 100, Stat 211.

### Pol Sc 204 Basic Concepts of Political Thought (3)

Introduction to major concepts (such as authority, equality, force, individual, justice, law, political obligation, power, rights, state) which affect our thinking about social relations. The social and political theories of thinkers from Socrates to Machiavelli. 3 lectures.

### Pol Sc 206 Judicial Process (3)

An examination of the legal process with emphasis on the social and political influences affecting the law and its enforcement. Topics considered include types of law, the structure of the judicial system including Supreme Court decision-making, police, judges and lawyers. 3 lectures.

### Pol Sc 214 Introduction to Public Administration (3)

Development of the executive functions in government. Making and carrying out public policy by government in the United States. Survey of administrative concepts and cases. 3 lectures.

**Pol Sc 250 Model United Nations (2)**

Preparation for participation in the campus Model United Nations. Procedure, MUN rules of debate, preparation of country positions, area papers, and policy statements suitable for use in mock United Nations sessions. May be repeated to six units. 2 lectures. Prerequisite: One course in Pol Sc or permission of instructor.

**Pol Sc 270 Politics Through Films (2)**

The political process as depicted through films. The way films (and secondarily, the mass media) affect perception and understanding of political processes. Class schedule will list topic. Total credit limited to 4 units. 1 lecture-recitation, 1 laboratory. Credit-No Credit grading.

**Pol Sc 302 American Political Process (3)**

Political parties, pressure groups, public opinion and the role of each in contributing to the dynamics of the American political process. 3 lectures. Prerequisite: Pol Sc 101 or 201.

**Pol Sc 303 Minority Group Politics (3)**

Analysis of political factors affecting minority groups in America. Involvement, organization and role of minority groups in the political process. Emphasis on the political behavior of black and chicano minorities. 3 lectures. Prerequisite: Eth S 114, Pol Sc 302 or consent of instructor.

**Pol Sc 306 Modern Political Thought (3)**

Theories of political control and the relationship between man and the state. 3 lectures. Prerequisite: Pol Sc 204 or junior standing.

**Pol Sc 307 American Political Thought (3)**

The central political ideas of America's leading thinkers from Thomas Paine to the present. 3 lectures. Prerequisite: Pol Sc 204.

**Pol Sc 310 Jurisprudence (3)**

The science of law as developed in the Western legal tradition. Definitions of laws and their implications for such associated legal concepts as justice, rights, punishment, causation and responsibility. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Pol Sc 311 Inter-American Relations (3)**

Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agriculture methods. Opportunities for employment in agriculture, engineering, and business. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: Pol Sc 201, Hist 204.

**Pol Sc 312 International Politics (3)**

International political processes and problems; foreign policies and politics in relations between states; conflicts and adjustments. Analyses of selected problems. 3 lectures. Prerequisite: Pol Sc 105.

**Pol Sc 313 National Strategies (3)**

Theoretical approaches to the study of war and peace and the evolution of contemporary defenses and strategies, especially those pertaining to the United States. The impact of national strategy on both national and international politics. 3 lectures. Prerequisite: Pol Sc 105 or advanced standing in ROTC.

**Pol Sc 318 Administrative Theory and Behavior (3)**

Conceptual examination of the theory and behavior of large and small bureaucracies. Role of the individual in the organization. Social, psychological and behavioral theories of organization. 3 lectures. Prerequisite: Pol Sc 214.

**Pol Sc 319 Public Personnel and Finance Administration (3)**

Processes of recruiting and managing personnel in the public service. Philosophy of public personnel administration, civil service system, labor issues. Theory and practice of public finance administration. Examination of the budget as an instrument of public policy. 3 lectures. Prerequisite: Pol Sc 214.

**Pol Sc 321 American Constitutional Law (3)**

Basic principles of American constitutional law. Role of the Supreme Court as arbiter of separation of powers and federalism. 3 lectures. Prerequisite: Pol Sc 101 and 102, or 201.

**Pol Sc 322 Protection of Civil Liberties (3)**

Role of Supreme Court as interpreter of Constitutional rights and liberties, freedom of expression, civil and criminal procedural guarantees, search and seizure, due process, and equal protection of the laws. 3 lectures. Prerequisite: Pol Sc 101 and 102, or Pol Sc 201.

**Pol Sc 325 Public Policy Analysis (3)**

Methods of analyzing the actions or inactions of government. Techniques for evaluating the outputs and impacts of governmental policies. Comparisons of various domestic issue areas such as transportation, education, housing, welfare, and law enforcement. 3 lectures. Prerequisite: Pol Sc 101 or 201.

**Pol Sc 335 Legislative Process (3)**

Organization and procedures of Congress, state and local legislative bodies, theory and practices of representative government. Problems of representation in selected political systems. 3 lectures. Prerequisite: Pol Sc 101 or 201.

**Pol Sc 340 Government Internship (1-12)**

Supervised work experience in a government or related public agency as approved by the School Dean. The intern will function as an employee subject to all the duties and responsibilities of employees engaged in comparable work. 30 hours of work experience per unit of credit. Maximum of 4 units of credit per quarter except for full-time assignments in Sacramento, Washington, D.C. or equivalent. Credit/no-credit. Recommended preparation: Junior standing with a 2.5 GPA.

**Pol Sc 350 Advanced Model United Nations (2)**

Participation in the campus Model United Nations. Procedure, MUN rules of debate, preparation of country positions, area papers, and policy statement for use in mock United Nations sessions. May be repeated to 6 units. 2 lectures. Prerequisite: Pol Sc 250 or permission of instructor.

**Pol Sc 380 Political Behavior (3)**

Political behavior of individuals and groups examined in light of biological, economic, psychological and social-psychological theories and research. 3 lectures. Prerequisite: Pol Sc 201 or equivalent.

**Pol Sc 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**Pol Sc 401 State and Local Government (3)**

Structure, function and problems of state, county, and local governments. 3 lectures. Prerequisite: Pol Sc 102 or 201.

**Pol Sc 402 Politics of Developing Areas (3)**

Institutions and processes of governments in a selected world area experiencing economic and political development. Each time the course is offered it will bear a subtitle descriptive of the particular area studied. 3 lectures. May be repeated to a total of 9 units. Prerequisite: Pol Sc 201 and Hist 205 or equivalent.

**Pol Sc 403 Municipal Government (3)**

Organization, politics, and problems of contemporary American municipalities. Trends in city life and government. 3 lectures. Prerequisite: Pol Sc 102 or 201.

**Pol Sc 404 Science, Technology and Public Policy (3)**

Analysis of the problems stemming from the relationship of technology and politics. Ecology, energy crisis, civilian-military complex, electronic eavesdropping, governmental support of technology, policy implications of technological change. The individual's role and responsibilities in a democracy. 3 lectures. Prerequisite: Pol Sc 201 or equivalent.

**Pol Sc 405 Politics of Municipal Finance and Planning (3)**

Political and economic considerations affecting the decision-making process of planning departments, commissions, and other local government decision-making boards. The budgetary process, interest groups, urban renewal, economic development at the subnational level. 3 lectures. Prerequisite: Pol Sc 401 or 403 or equivalent.

**Pol Sc 411 Contemporary U.S. Foreign Policy (3)**

The formulation and conduct of U.S. foreign policy. Analysis of the theory and elements of U.S. strategy; diplomacy, propaganda, economic operations, psychological warfare, and military strategies. 3 lectures. Prerequisite: Pol Sc 105.

**Pol Sc 412 International Organization (3)**

Structure, functions, powers of the United Nations, selected regional organization, and specialized agencies. Current problems facing international organizations. 3 lectures. Prerequisite: Pol Sc 105.

**Pol Sc 417 Asian Politics (3)**

Analysis of political, economic, and social institutions and conditions in selected Asian nations. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Pol Sc 418 Soviet Politics (3)**

Study and analysis of political, economic, and social institutions and conditions of the U.S.S.R. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Pol Sc 424 Organizing and Teaching Political Science (3)**

Organization, selection, presentation, application, and interpretation of political science subject matter for teaching of high school government and civics. 3 lectures. Prerequisite: Admission to teacher education program or valid teaching credential.

**Pol Sc 442 The American Presidency (3)**

The nature and problems of contemporary presidential leadership emphasizing the impact of the bureaucracy, congress, public opinion, the courts, interest groups, and the party system upon the presidency and national policy making. 3 lectures. Prerequisite: Pol Sc 101 or 201.

**Pol Sc 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**Pol Sc 463 Undergraduate Seminar (2)**

Preparation and presentation of current developments in the field of political science. 2 meetings. Prerequisite: Pol Sc 461, 462 or consent of instructor.

**Pol Sc 465 Middle Eastern Politics (3)**

Study and analysis of political, economic, and social institutions and conditions of the countries of the Middle East and North Africa. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**Pol Sc 468 African Politics (3)**

Study and analysis of indigenous institutions, Western influences, and nationalism in Africa south of the Sahara. Selective area studies illustrative of colonialism and the politics of independence. 3 lectures. Prerequisite: Junior standing or consent of instructor.



**Pol Sc 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Pol Sc 510 Administration in Developing Nations (3)**

Processes of administration with reference to the differing cultural, political, and economic environments of the developing areas of the world. 3 lectures. Prerequisite: Graduate standing.

**Pol Sc 590 Seminar in Political Science (3)**

Special problems in selected areas of Political Science. Each seminar will have a subtitle describing its nature and content. 3 lectures. Maximum of 6 units may be earned. Prerequisite: Graduate standing and consent of instructor.

## **POULTRY INDUSTRY**

**PI 121 Poultry Industry Development (4)**

Scope and importance of the poultry industry as a part of California agriculture. Poultry organizations, publications, employment opportunities. Basic skills in industry organization. 3 lectures, 1 laboratory.

**PI 122 Replacement Programs and Broiler Production (4)**

Organization and planning of the replacement program on the commercial poultry enterprise. Modern techniques and practices including costs, facilities, and management of the replacement program. 3 lectures, 1 laboratory.

**PI 123 Poultry Feeding and Nutrition (4)**

Nutritional requirements, feeding principles and modern practices. Formulation of rations for specific purposes and commercial economy practices. Feed industry distributive procedures. 3 lectures, 1 laboratory. Prerequisite: DH 101.

**PI 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**PI 221 Poultry Selection and Egg Production (3)**

Biological environmental factors that affect quality, size, and number of eggs produced. Techniques and practices of working with the commercial producing flock. 2 lectures, 1 laboratory.

**PI 222 Poultry Products, Processing and Marketing (3)**

Assembling, processing, distributing and merchandising of poultry meat and eggs. Standardization and regulations applicable to the marketing of poultry products. Development and promotion of consumer products. 2 lectures, 1 laboratory.

**PI 223 Poultry Incubation (2)**

Embryology fundamentals and metabolism of the developing embryo. Artificial incubation practices as applied in the commercial hatchery. Nutritional, genetic and environmental factors that affect the hatch. 1 lecture, 1 laboratory.

**PI 230 General Poultry Production (3)**

Survey of the various phases of the modern poultry industry including nutrition, breeding, flock health, production and management. Business aspects of poultry production and marketing of products. Not open to poultry majors. 2 lectures, 1 laboratory.

**PI 231 Poultry Anatomy and Physiology (2)**

Structural aspects and normal functions of the principal systems of domestic poultry. 1 lecture, 1 laboratory. Prerequisite: Zoo 131 or Bio 100.

**PI 233 Poultry Plant Design and Equipment (2)**

Design and planning a modern commercial poultry operation. The engineering of buildings and equipment to specific commercial functions. Coordination of buildings, equipment and operations designed for maximum plant efficiency. 1 lecture, 1 laboratory.

**PI 305 Game Bird Propagation and Management (3)**

Game bird anatomy, physiology and nutrition. Health, natural and artificial reproduction, and rearing techniques as practiced in public resource programs and private enterprises. 3 lectures. Prerequisite: One quarter college mathematics, one quarter animal biology and Chem 121.

**PI 306 Game Bird Propagation and Management Laboratory (1)**

Field trips and basic skills in propagation and management in support of PI 305. 1 laboratory. Prerequisite or concurrent: PI 305.

**PI 321 Applied Poultry Breeding (3)**

Genetic applications in the development of commercial poultry stocks for specific productive designs. Application of commercial breeding techniques for flock improvement. Analysis of breeding records. 3 lectures.

**PI 322 Hatchery Business Organization (4)**

Organization and management of a commercial hatchery operation. Recruiting and supervising personnel, organizing flow of products and planning the distribution systems. Managing the finance, advertising, public relations, and sales phases of the hatchery organization. 3 lectures, 1 laboratory.

**PI 323 Poultry Diseases and Hygiene (3)**

Management, sanitation and vaccinating programs for the maintenance of the flock health. Control and prevention of diseases and parasites. 3 lectures. Prerequisite: Bact 221.

**PI 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**PI 421 Turkey Industry (3)**

Coordination and operation of a commercial turkey enterprise. Application of nutritional, breeding, disease control and marketing practices. Planning and supervising the specialized phases of the turkey enterprise. Development of new products and specialized marketing techniques. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

**PI 422 Advanced Poultry Enterprise Supervision (3)**

Coordination and supervision of the modern commercial poultry enterprise. Analysis of operational procedures, efficiency practices, cost and quality control techniques. Interrelationship of business practices to the enterprise success. 3 lectures. Prerequisite: Consent of instructor.

**PI 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**PI 463 Undergraduate Seminar (2)**

Preparing and presenting in an organized manner reports on new trends, special problems, research developments related to the poultry industry. Group discussion of industry special problems. 2 meetings.

**PI 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: consent of instructor.

**PI 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**PI 530 Poultry Business Dynamics (3)**

Organizational structure of modern poultry industry. Economic integration of production, processing, and marketing. Role of poultry and poultry products in the economic and nutritional health of state and nation. 3 lectures. Prerequisite: Graduate standing and consent of instructor.

**PI 581 Graduate Seminar in Poultry (3)**

Current trends and characteristics of the poultry industry enterprise. Group discussions of skills, techniques and practices to improve teaching of vocational agriculture as it applies to poultry. 3 meetings.

## **PSYCHOLOGY**

**Psy 104 Effective Study Techniques (2)**

Designed to acquaint students with basic aims and objectives of going to college, and to provide adequate instruction and practice in specific study skills; effective study methods, note-taking, time-planning, memory, concentration. 1 lecture, 1 quiz section.

**Psy 201 General Psychology (3)**

Introduction to psychological research and applications; psychobiology, perception, learning, motivation, consciousness, cognition, personality and assessment, social behavior, psychopathology, and psychotherapy. 3 lectures. A student may enroll for credit in either Psy 201 or Psy 202, but not both.

**Psy 202 General Psychology (3)**

Introduction to psychological research and applications; psychobiology, perception, learning, motivation, consciousness, cognition, personality and assessment, social behavior, psychopathology, and psychotherapy. 2 lectures, 1 recitation. A student may enroll for credit in either Psy 202 or Psy 201, but not both.

**Psy 251 Laboratory in Group Activities (1-3)**

Skills and techniques of solving problems in large and small groups; conducting and reporting meetings; analyses of leadership dynamics in campus organizations. Total credit limited to 6 units. 1-3 activities.

**Psy 301 Psychology of Personal Development (3)**

Approaches to self exploration and self modification; conceptions of human potential; evaluation and development of personal effectiveness. 3 lectures. Prerequisite: Psy 201 or 202.

**Psy 302 Behavior in Organizations (3)**

Factors involved in organizing; types and characteristics of functioning organizations; the individual in the organization; methods of obtaining organization members. Psychological issues relevant to the maintenance of the organization. Motivation, attitudes, leadership, group phenomena, communication, decision-making and organizational change. 3 lectures. Prerequisite: Psy 201 or 202.

**Psy 303 Human Sexuality (2)**

Understanding aspects of personal sexuality. Sexual development, attitudes, role awareness, intimacy, biological aspects of sexuality, homosexuality, sexual dysfunction, family planning and birth. Credit-No Credit. 2 lectures.

**Psy 304 Comparative and Physiological Psychology (3)**

Variables relevant to the interaction of physiological and behavioral processes. Learning, motivation, emotion, perception, individual differences, social and abnormal behaviors as a function of the nervous and endocrine systems, sensory structures, genetic factors, effects of drugs. 3 lectures. Prerequisite: 6 units of psychology or 6 units of natural science.

**Psy 307 Abnormal Psychology (3)**

Abnormal behavior of individuals. Dynamics, etiology, symptoms, treatment and prevention of the more severe personality and behavior disorders. Includes the psychoneuroses, psychoses, alcohol and drug addiction, psychosomatic illnesses, and character disorders. 3 lectures. Prerequisite: Psy 201 or 202.

**Psy 308 Psychology of Consciousness (3)**

Characteristics and functions of selected, qualitatively unique patterns of consciousness such as hypnosis, meditation, dreaming, drug experiences and parapsychological phenomena, with particular emphasis on adaptive and maladaptive expressions of these states of consciousness. 3 lectures. Prerequisite: Psy 202 or consent of instructor.

**Psy 311 Human Factors and Environmental Psychology (3)**

Man-environment transactions including human decision-making and problem-solving capabilities and limitations; information capacity of the senses; effects of the physical environment upon individuals and groups. 3 lectures. Prerequisite: Psy 201 or 202.

**Psy 320 Behavioral Effects of Drugs and Alcohol (3)**

Effects of drugs and alcohol on motivation, emotion, perception, and learning. Organization of research findings into tentative theoretical and treatment models relevant to personal, social, and organizational adjustment. 3 lectures. Prerequisite: Junior standing.

**Psy 401 Social Psychology (3)**

Human behavior as a product of social influence and interaction; conformity, attitudes and attitude change, interpersonal attraction and attributional processes, cooperation, competition, aggression, leadership. 3 lectures. Prerequisite: Psy 201 or 202 or permission of instructor.

**Psy 432 Psychological Testing (3)**

Principles and procedures of the selection, the administration, scoring, and the interpretation of achievement tests, aptitude tests including scholastic aptitude, interest inventories, and personality inventories. 3 lectures. Prerequisite: 9 units of psychology.

**Psy 433 Individual Testing (3)**

Principles and procedures of individual testing. A survey of individual tests for intelligence, achievement, perception and personality; emphasis on the tests commonly used by school psychologists and tests that teachers may use for diagnosis of learning difficulties. 3 lectures. Prerequisite: Psy 432.

**Psy 446 Assessment of Learning Disabilities (3)**

Assessment of physical, intellectual, social and emotional characteristics of children. Use of psychological tests for diagnosis of learning disabilities and for developing prescriptive teaching. 3 lectures. Prerequisite: Psy 202, 432.

**Psy 454 Personality (3)**

Personality theories and research; human motivation; description and development of personality characteristics; adaptation and self-actualization. 3 lectures. Prerequisite: 6 units of psychology.

**Psy 455 Learning and Motivation (3)**

Principles, major theories, methods and research findings relevant to major experimental areas of learning and motivation. Derivation of principles from research data, current research contributions, and implications for applied problems. 3 lectures. Prerequisite: 6 units of psychology.

**Psy 456 Behavioral Disorders in Children (3)**

Applications of psychological learning principles to childhood behavioral disorders: aggression, delinquency, stress reactions, emotional-motivational disorders, perceptual-attentional deficiencies, neuroses, psychoses, psychosomatic disorders, biological dysfunctions, and retarded social and cognitive development. 3 lectures. Prerequisite: 3 units of psychology.

## **RECREATION ADMINISTRATION**

**Rec 101 Recreation and Leisure Services (3)**

History, philosophy, theory, and community organization of recreation. Various agencies providing recreation and leisure services. Emphasis upon functions, areas, facilities, clientele, and career opportunities. Field visits required. 3 lectures. Prerequisite: Nonmajors: consent of instructor.

**Rec 103 Outdoor Recreation Skills (2)**

Introduction to a wide variety of outdoor recreation and leisure pursuits with emphasis upon skill acquisition. 1 lecture, 1 laboratory. Prerequisite: nonmajors: consent of instructor.

**Rec 105 Recreation Leadership (3)**

Recreation leadership with small and large groups. Emphasis upon appropriate theories and techniques for specific clientele. 2 lectures, 1 two-hour laboratory. Prerequisite: Nonmajors: consent of instructor.

**Rec 210 Programming for Leisure (3)**

Methods of program planning, organization, implementation and evaluation in public and private settings; interrelationship of needs and interests of people, physical settings, and activity content; emphasis on program construction and scheduling. 2 lectures, 1 two-hour laboratory. Prerequisite: Rec 101, 105.

**Rec 252 Recreation for People with Disabling Limitations (4)**

Adaptation of recreation and leisure services for persons with special needs or limitations; role of institutions and community agencies; specialized leadership techniques; modification requirements for programs, areas, facilities, equipment, and supplies. 3 lectures, 1 laboratory. Prerequisite: Rec 210. Nonmajors: consent of instructor only.

**Rec 323 Supervisory Roles in Recreation Administration (3)**

Analysis of the supervisory roles in public, private, commercial and voluntary agencies offering organized leisure services. Methods, techniques, and evaluation systems. Field visits required. 3 lectures. Prerequisite: Rec 210.

**Rec 324 Organizational Patterns of Recreation Administration (3)**

Scope, levels, concepts, structure, and legal aspects of public, private, commercial and voluntary recreation and leisure services agencies. Field visits required. 3 lectures. Prerequisite: Rec 101, 105, 210.

**Rec 337 Implementation of Outdoor Recreation Programs (3)**

Implementation of leisure programs in organized camps and related settings. Qualifications and duties of outdoor recreation personnel; professional opportunities in the field. 2 lectures, 1 two-hour laboratory. Prerequisite: Rec 101, 103, 105, 210. Nonmajors: consent of instructor only.

**Rec 352 Recreation Therapy (4)**

Philosophy, principles, and techniques in the use of recreation as a treatment modality in rehabilitating people with illness or disabling limitations. Role of recreation in total rehabilitation process of various agencies. Field visits required. 3 lectures, 1 laboratory. Prerequisite: Rec 252.

**Rec 364 Commercial Recreation and Leisure Services (3)**

Analysis of the types of commercial and private recreation enterprises; probable trends and directions; requirements and procedures for organizing and implementing commercial recreation services. Field visits required. 3 lectures. Prerequisite: Rec. 210.

**Rec 400 Special Problems For Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units with a maximum of 2 units per quarter. Prerequisite: permission of curriculum coordinator.

**Rec 424 Management of Recreation and Leisure Services (3)**

Principles, practices and procedures in recreation administration; emphasis on budgeting, areas and facilities management, and community relations. Field visits required. 3 lectures. Prerequisite: Rec 324.

**Rec 430, 431 Directed Field Experience (3) (3)**

Practical work experience in related phases of Recreation Administration in organization or agency approved by curriculum coordinator. 200 hours required in field for each course. Individual conferences as required. Prerequisite: Rec 324, senior standing, approval of curriculum coordinator.

**Rec 432 Honors Internship (9)**

Directed full-time professional experience in a recreation agency. Comprehensive exposure to agency's resources and program. Individual development in program planning, conduct and evaluation; budget and finance, legal aspects; community and public relations. Prerequisite: Rec 324, senior standing, 3.0 GPA overall, approval of curriculum coordinator.

**Rec 461, 462 Senior Project (2) (2)**

Selection and completion, under faculty supervision, of an investigative project typical of problems which graduates must solve in their respective career field entry positions. Required minimum of 120 hours. Analytical, formal report is required. Prerequisite: Senior standing and completion of Actg 131 and NRM 207.

**Rec 463 Undergraduate Seminar (2)**

Review of current research, projects and problems related to the student's field experience or internship. Preparation and presentation of reports on field experiences, problems, and research activities. Taken concurrently with Rec 431 or Rec 432. Prerequisite: Rec 324, senior standing, approval of curriculum coordinator.

**Rec 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## **SOCIAL SCIENCES**

**Soc Sc 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**Soc Sc 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

**Soc Sc 424 Organizing and Teaching Social Sciences (3)**

Organization, selection, presentation, application, and interpretation of social sciences subject matter for teaching of high school civics and social problems. 3 lectures. Prerequisite: Admission to the teacher education program or possession of valid teaching credential.

**Soc Sc 440 Supervised Field Work (3)**

Supervised observation, research and work in community organizations, public agencies, etc., with attention to the barrio and ghetto. Prerequisite: Senior standing and/or permission of instructor. Total credit limited to 9 units.

**Soc Sc 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing or consent of instructor.

**Soc Sc 463 Undergraduate Seminar (2)**

Intensive study of selected social problems with application of techniques for analysis. 2 meetings. Prerequisite: Senior standing or consent of instructor.

**Soc Sc 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## **SOCIOLOGY**

**Soc 105 Introduction to Sociology (3)**

Orientation to the nature of the study of society; survey of approaches to social analysis. Emphasis upon primary concepts describing environment, social structure, and social change for increased understanding of human relations. An overview of the systems of social relationships. 3 lectures.

**Soc 106 Social Problems (3)**

An appraisal of various factors from which social problems of the contemporary American society emerge and alternative procedures for dealing with such problems. 3 lectures.

**Soc 201, 202, 203 Principles of Sociology (3) (3) (3)**

Sources of materials and methods of sociological study; concepts and principles; structure and process of group life; social institutions. Applications of techniques in field study. 3 lectures.

**Soc 206 The Sociology of Family Life (3)**

Description and analysis of the social relationships within the family group. Examination of alternative solutions to problems which arise in family living. 3 lectures.

**Soc 301 Social Welfare in the U.S. (3)**

Introduction to the field of social welfare; the development of American social work; scope and diversity of specific programs designed to meet welfare problems in contemporary society. 3 lectures. Prerequisite: 9 hours of sociology or consent of instructor.

**Soc 302 Social Work (3)**

Development of public welfare services; current problems and policy issues; analysis of current programs of social insurance, public assistance programs; interagency relationships. 3 lectures. Prerequisite: Soc 301.

**Soc 305 Sociology of Social Movements (3)**

An analysis of the causes and impact of social movements, with a focus on the contemporary world. Included in this analysis are events ranging from riots, lynchings and panics to political, religious, racial, and social movements. 3 lectures. Prerequisite: Three units of sociology or consent of instructor.

**Soc 310 Socialization: Self and Society (3)**

Analysis of social interaction relating to development of self; reciprocal influences between individuals and society. Development of social roles and the symbolic nature of interaction. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

**Soc 313 Urban Sociology (3)**

Structure of social relationships in the community; physical structure of communities; patterns of community cooperation and conflict; changing patterns of urban community life; social class and political influence on the community level. 3 lectures. Prerequisite: One sociology course or consent of instructor.

**Soc 315 Race Relations (3)**

Structure of relationships among ethnic and racial groups. Source of discrimination and prejudice in personality and social structure. Patterns of segregation. Evaluation of current techniques for restructuring intergroup relations. 3 lectures. Prerequisite: Eth S 114; 6 hours of sociology or consent of instructor.

**Soc 316 American Minorities (3)**

Problems in assimilation of the Afro-American, Mexican-American, and American Indian. Analysis of internal group structures and external factors impeding assimilation of these minorities. Dynamics of intergroup relationships. Assessment of current programs aimed at assimilation. 3 lectures. Prerequisite: Six units of sociology or consent of instructor.

**Soc 323 Social Stratification (3)**

Social class and the distribution of status and power in society, with emphasis on contemporary United States; social mobility; relationships of stratification to mental illness, race, family systems, crime and delinquency, etc. 3 lectures. Prerequisite: 6 hours of sociology or consent of instructor.

**Soc 330 Social Change (3)**

Description and analysis of social change in contemporary American society as it relates to major revolutionary changes in this century; variables alleged to affect social change; impact of social change upon traditional societies; prospects for future social change. 3 lectures. Prerequisite: 6 units of Sociology.

**Soc 333 Social Research Methods (3)**

Research design, development of scales, uses of computers, questionnaire construction and interview techniques, sampling methods and analysis of data. 3 lectures. Prerequisite: one sociology course and Stat 211; or consent of instructor.

**Soc 344 Sociology of Poverty (3)**

Variable indicators of poverty in modern society. Chief features of the subculture of the poor. Analysis of different explanations for the persistence of poverty. Survey of proposals for reducing poverty. 3 lectures. Prerequisite: College course in sociology or consent of instructor.

**Soc 402 Crime and Delinquency (3)**

Theories of delinquent and criminal behavior; analysis of institutional and other approaches to rehabilitation of criminals and delinquents. 3 lectures. Prerequisite: Two courses in sociology or consent of instructor.

**Soc 412 Treatment of Criminals and Delinquents (3)**

Approaches to the control and rehabilitation of adult and juvenile offenders; philosophy of treatment strategies; history and analysis of probation, imprisonment, parole and preventive programs. 3 lectures. Prerequisite: Soc 402.

**Soc 413 Methods of Social Work (3)**

Theories, concepts, values stressed in social work. Social casework. Principles and practices used by social workers serving individuals and families in correctional, public assistance, medical, psychiatric youth services, and other settings. Discussion of case material and available literature. 3 lectures. Prerequisite: Soc 302.



**Soc 414 Social Work Practicum (3)**

The social-intervention practice model and its application. Social intervention goals and strategy. Social workers and social agencies. Professional social work skills in assessment, observation, interviewing, engagement, communication, and intervention activities. Reading and discussion of illustrative cases. 3 lectures. Prerequisite: Soc 413 or equivalent, or consent of instructor.

**Soc 421 Social Theory (3)**

Analysis of the nature and types of classical and contemporary sociological and anthropological theory. 3 lectures. Prerequisite: Soc 203.

**Soc 431 Population Problems (3)**

Description and analysis of population variables and their sociological consequences. 3 lectures. Prerequisite: One sociology course and Stat 211; or consent of instructor.

## **SOIL SCIENCE**

**SS 100 Orientation in Soil Science (1)**

Understanding the depth and breadth of the study of soils as a science. Student and professional organizations. 1 lecture.

**SS 121 Soils (4)**

Physical, chemical, and biological properties of soils as related to agriculture. 3 lectures, 1 laboratory.

**SS 122 Soil Management (4)**

Effect of tillage, manuring, drainage, and irrigation practices on soil productivity. 3 lectures, 1 laboratory. Prerequisite: SS 121.

**SS 123 Soil Materials (3)**

Origin, composition, and identification of rocks, minerals, and other materials important in the development of soils. Land forms as related to the nature and properties of soils. 2 lectures, 1 laboratory. Prerequisite: SS 121, Chem 121 or Chem 127.

**SS 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**SS 202 Soil Conservation (3)**

Climate, topography, soils and land use in relation to soil and water losses. Evaluation of soil and water conservation programs and practices. 3 lectures. Prerequisite: SS 121 or consent of instructor.

**SS 221 Fertilizers (4)**

Composition, value, and use of fertilizer materials and soil correctives. Methods employed in the manufacture, distribution, and application of fertilizers. 3 lectures, 1 laboratory. Prerequisite: SS 121.

**SS 321 Soil Classification (4)**

Field study of morphological characteristics of local soils. Methods and concepts employed in soil surveying and soil taxonomy. 2 lectures, 2 laboratories. Prerequisite: SS 122, SS 123.

**SS 322 Soil Fertility (3)**

Plant nutrient requirements of crops. Effect of soil and climatic conditions on the availability of nutrients in the soil. Diagnostic techniques in soils and crops. 2 lectures, 1 laboratory. Prerequisite: SS 122, 221, Chem 122, or Chem 128.

**SS 332 Conservation Techniques (3)**

Basic development of subject matter, materials, and activities for classroom instruction in soils, water, range, woodland, and recreation resources. 2 lectures, 1 laboratory.

**SS 333 Tropical Soils (4)**

Nature and properties of soils occurring in the tropics, their origin, morphology, classification, fertility, management and conservation. 3 lectures, 1 laboratory. Prerequisite: SS 121, Chem 122 or Chem 128.

**SS 340 Forest and Range Soils (3)**

Ecosystem approach to the chemical, biological, physical and mechanical properties of forest and range soils. Interpretation of specific research findings and their applications to management problems. 2 lectures, 1 laboratory. Prerequisite: SS 121.

**SS 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**SS 414 Soil, Plant and Water Analysis (4)**

Quantitative instrumental and laboratory techniques for establishing nutrient status of soils and element content of plants and water as related to crop production. 3 lectures, 1 laboratory. Prerequisite: SS 322, Chem 129 or consent of instructor.

**SS 422 Soil Microbiology (3)**

Biochemical activities of soil organisms. Effect of soil organisms on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 2 lectures, 1 laboratory. Prerequisite: SS 122, 221, Bact 221, Chem 328 or consent of instructor.

**SS 423 Soil Chemistry (4)**

Fundamental concepts and practices in soil chemistry. Methods of analysis and interpretation of significant investigations for the management of soils. 3 lectures. 1 laboratory. Prerequisite: SS 322, Chem 129 or consent of instructor.

**SS 432 Soil Physics (4)**

Advanced study of the physical properties of soils. Application of physical-chemical soil relationships to farming and engineering practices. 2 lectures, 2 laboratories. Prerequisite: SS 122, Phys 104, Chem 122, or Chem 128, or consent of instructor.

**SS 433 Land Use Planning (3)**

Development of plans and practices for management of agricultural, recreational and urban land use by evaluating the soil capabilities through the use of Soil Survey Reports. 2 lectures, 1 laboratory. Prerequisite: SS 202 or consent of instructor.

**SS 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**SS 463 Undergraduate Seminar (2)**

Review of current research, experiments, and problems related to the students' major field of interest. Preparation and presentation of reports on problems or research activities. 2 lectures.

**SS 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**SS 471 Selected Advanced Laboratory (1-3)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. One to three laboratories. Prerequisite: Consent of instructor.

**SS 508 Conservation Legislation (3)**

Legislation enabling and implementing conservation programs. Legal responsibilities of individuals and groups in the development of natural resources. Proposed or needed legislation for more effective conservation. 3 lectures. Prerequisite: Senior or graduate standing.

**SS 521 Soil Morphology (3)**

Advanced study of the morphological characteristics and genesis of soils and their relationship with major landform features. New techniques used in modern systems of soil classification and mapping. 2 lectures, 1 laboratory. Prerequisite: SS 321 or consent of instructor.

**SS 581 Graduate Seminar in Soils (3)**

A review of current research, experiments and problems related to soil science. Development of special demonstration and field plot trials for educational groups. 3 lectures.

**SS 582 Graduate Seminar in Land Management (3)**

Development of plans and practices for the management of crop, range, and wood land. 2 lectures, 1 laboratory. Prerequisite: Graduate standing, SS 433, Cr Sc 411 or equivalent.

## **SPANISH**

**Span 101, 102, 103 Elementary Spanish (5) (5) (5)**

For beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill required. To be taken in numerical sequence. 5 lectures.

**Span 104 Intensive Elementary Spanish (15)**

Class practice in pronunciation, syntax, reading, writing, and conversation. Offered in summer only. Laboratory drill required. 15 lectures.

**Span 201, 202, 203 Intermediate Spanish (3) (3) (3)**

Review of Spanish grammar and practice in writing and oral expression based on social and cultural values. Sequence courses. Prerequisite: Span 103 or permission of instructor. Simultaneous enrollment in Span 221, 222, 223 is recommended. 3 lectures.

**Span 221, 222, 223 Spanish Conversation (2) (2) (2)**

Current idiomatic usage with emphasis on contemporary culture. Compositions to supplement oral classroom practice. 2 lectures. Prerequisite: Span 103 or permission of instructor. Simultaneous enrollment in Span 201, 202, 203 is recommended.

**Span 231, 232, 233 Vocational Spanish (4) (4) (4)**

Practical communication skills: comprehension, reading, writing, and speaking. Lexicon for specific areas of professional and technical specialization in agriculture, medicine, social work, law and law enforcement. Periodic visits may be made to areas where Spanish is heard in its practical application. Oral practice in language laboratory. 3 lectures, 1 laboratory. Prerequisite: Span 103 or equivalent, or consent of instructor.

**Span 301 Advanced Spanish Grammar and Composition (3)**

Oral and written development of structural grammar, syntax, and complex components of Spanish. Vocabulary expansion and idiomatic construction. Written composition. Translations to examine linguistic and semantic differences. 3 lectures. Prerequisite: Span 203.

**Span 305 Significant Writers in Spanish (4)**

Study in depth of selected Spanish writers, as individual writers or in groups. 4 lectures. Prerequisite: Span 203 or equivalent.

**Span 330, 331 Spanish Composition for the Bilingual Student (4) (4)**

Spanish-English contrastive analysis underlining their linguistic and semantic differences. Essay techniques and translation practice. Vocabulary building, spelling and syntax, difficult grammatical idiomatic expressions and the Chicano Spanish lexicon: 3 lectures, 1 activity. Prerequisite: Span 203 or consent of instructor. (Oral proficiency must be demonstrated.) This course does not fulfill upper division minor requirements.

## Span 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## SPEECH

### Sp 111 Professional Fields of Speech (1)

Occupational opportunities, professional organizations, and important journals in the various fields of speech. Development and trends in forensics, discussion, theater arts, and speech correction. 1 lecture.

### Sp 200 Principles of Speech (3)

Introduction to the fundamentals and principles which underlie effective speech communication. Practical experience in various types of speaking situations: informative speaking, persuasive speaking, and panel discussion. 3 lectures.

### Sp 206 Voice and Articulation (3)

Physiology of normal speech; assessment and improvement of students' vocal and articulation practices to enhance oral skills. 3 lectures.

### Sp 214 Communication Theory (4)

Concepts and theories of the human communication process. Psycho-sociological aspects of attitude change. Interpersonal relations in an informational-behavioral context. 4 lectures. Prerequisite: Psy 202, consent of instructor.

### Sp 215 Argumentation (4)

Analysis of reasoning and evidence in persuasive discourse. Practice in the composition and delivery of reasoned speeches. Introduction to debate. 4 lectures.

### Sp 217 Essentials of Discussion (4)

Basic principles and techniques of discussion. Survey of the importance of discussion in contemporary society, including study of and practice in informal group discussion, panel discussion, symposium, and forum. 4 lectures.

### Sp 250 Forensic Activity (1)

Lower division participation in intercollegiate forensic activities. Any student who wishes to receive academic credit for participation in such activities during the quarter should enroll. Specific assignments will be determined by instructor. May be repeated to 6 units. 1 activity.

### Sp 301 Debate (4)

Techniques of argumentation and their application to debate; logic and reasoning; fallacies of reasoning; experience in various forms of formal argument, including intercollegiate debate; judging and debate program administration. 4 lectures. Prerequisite: Sp 200.

### Sp 302 Introduction to Communicative Disorders (4)

Survey of speech, language, and hearing disorders emphasizing causes, symptoms, and treatment; role of the speech therapist in the community and in public schools; role of the classroom teacher in speech improvement. 4 lectures.

### Sp 304 Persuasion (4)

Persuasive theory including methods of attention, suggestion, motivation, and adaptation employed to influence feelings, attitude, change and action. Analysis of persuasive discourse and the application of persuasive methods in speaking. 4 lectures. Prerequisite: Sp 214 and 215 or consent of instructor.

### Sp 305 Oral Interpretation (4)

Basic theory of interpretation; selection, preparation, and presentation of material for oral reading. 4 lectures.

**Sp 306 Phonetics (3)**

Phonetic basis of speech sounds in American English, their development, symbolization, production, and characteristics; practice in broad transcription, using the International Phonetic Alphabet. 3 lectures.

**Sp 308 Industrial and Professional Speech (3)**

Speech in industrial, professional, and informal business including interviews, sales talks, and conference speaking. Preparation of oral reports in business and professional situations. 3 lectures. Prerequisite: Sp 200, or consent of instructor.

**Sp 310 Oral Interpretation of Children's Literature (3)**

Techniques of oral interpretation; selection, preparation, and presentation of literature, K-6. Problems unique to story reading and telling, poetry and prose, choral reading and group performance. 3 lectures.

**Sp 311 Cross-Cultural Communication (3)**

Examination and clarification of communication problems within and between ethnic groups. 3 lectures.

**Sp 313 The Development of Speech and Language (4)**

Development of speech and language from birth to adolescence. Physical and psychological processes contributing to the emergence, practice, and mastery of speech and language. 4 lectures. Prerequisite: Sp 302, 306.

**Sp 317 Rhetoric: Classical Period to Renaissance (4)**

Early development of rhetorical theory in Greco-Roman civilization; analysis of the canons of rhetoric; rhetorical thought of Sophists, Isocrates, Plato, Aristotle, Cicero and Quintilian; the medieval contributions of Augustine, Boethius and Martianus Capella. 4 lectures.

**Sp 318 Rhetoric: Renaissance to the Present (4)**

Development of rhetorical theory in the Renaissance period through contemporary concepts of rhetoric; contributions of Ramus, Cox, Wilson, Bacon, Sheridan, Walker, Campbell, Whately, Blair, and Adams; contemporary theories of Burke, Weaver, Richards, Toulmin and Perelman. 4 lectures. Prerequisite: Consent of instructor.

**Sp 319 Rhetorical Criticism (4)**

Theory and method used in the analysis and evaluation of rhetorical discourse. Study of critical essays. Practice in interpreting and evaluating persuasive discourse. 4 lectures. Prerequisite: Sp 304 or 317 or consent of instructor.

**Sp 350 Advanced Forensic Activity (2)**

Upper division participation in intercollegiate forensics. Administration and operation of tournaments held annually on campus and in the community. May be repeated to 6 units. 2 activities. Prerequisite: Sp 250.

**Sp 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

**Sp 403 Organizational Communication (3)**

Relationships of human behavioral dynamics within the organizational process. Functions of information networks in organizations. The role of leadership in the business-industrial context. 3 lectures. Prerequisite: Junior standing.

**Sp 405 Advanced Oral Interpretation (3)**

Choral reading, readers theater, and special projects. 3 lectures. Prerequisite: Sp 305, or consent of instructor.

**Sp 406 Communication in Children's Environments (4)**

Exploration of communication development, preschool and elementary school children; construction, presentation, and evaluation of appropriate instructional experiences; student-teacher-parent interaction. Communication style, environmental stimuli, dialectal differences and bilingualism, measurement of communication competence. 4 lectures.

**Sp 408 American Public Address (4)**

Historical survey to 1865; evaluation of great speakers and speeches as they pertain to the development of American institutions. 4 lectures. Prerequisite: Sp 304, or consent of instructor.

**Sp 409 American Public Address (4)**

Historical survey from 1865 to present; evaluation of great speakers and speeches as they pertain to the development of American institutions. 4 lectures. Prerequisite: Sp 304, or consent of instructor.

**Sp 411 Communication Research (4)**

Communication research strategy methodology. Basic methods of designing research in empirical and non-empirical communication studies. 4 lectures. Prerequisite: Sp 214, CSc 110.

**Sp 424 Organizing and Teaching Speech Communication (3)**

Curricula, methods, and procedures that may be used effectively in teaching speech classes and directing speech activities in secondary schools. Selection and organization of teaching material. 3 lectures. Prerequisite: Admission to teacher education program or valid teaching credential.

**Sp 461 Senior Project (2)**

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Minimum 60 hours total time.

**Sp 463 Undergraduate Seminar (2)**

Discussion of individual projects, oral reports on material in current professional writings. 2 lectures. Prerequisite: Senior standing.

**Sp 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

**Sp 512 Psycholinguistic Disabilities (3)**

Causes, identification, evaluation, and treatment of various types of language disorders. Oral language, reading, and writing disabilities. Organic, environmental, and emotional factors. 3 lectures. Prerequisite: Sp 302, 313.

**Sp 590 Seminar in Speech (1-3)**

Readings and papers on special problems in selected areas of speech. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Graduate status.

## **STATISTICS**

**Stat 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: permission of department head.

**Stat 211 Elementary Probability and Statistics (3)**

Classification of statistical data; calculation and uses of various averages; measures of variability; permutations, combinations, and elementary probability; binomial and normal distributions; random sampling, confidence limits. 3 lectures. Prerequisite: Intermediate Algebra or equivalent.

**Stat 212 Statistical Methods (3)**

Tests of hypotheses, confidence intervals; nonparametric methods; linear regression and correlation; chi-square and F-distributions; index numbers; time series; analysis of variance. 3 lectures. Prerequisite: Stat 211.

**Stat 251 Statistical Inference for Management I (3)**

Descriptive statistics. Review of probability distributions. Pt. and interval estimation of common population parameters. Hypothesis tests of population means, proportions, and variances. Chi-square analysis. Use of calculators and minitab as computing tool. 3 lectures. Prerequisite: Math 121, CSc 120.

**Stat 252 Statistical Inference for Management II (3)**

Regression, correlation, multiple regression, time series, and forecasting. Use of computers, batch and terminal, assumed throughout course. Experience with large statistical computer packages in analyzing information in data-bases. 3 lectures. Prerequisite: Stat 251.

**Stat 313 Analysis of Variance (3)**

Applications of statistics for students not majoring in statistics or mathematics. Analysis of variance including the one-way classification, randomized blocks, latin squares, and factorial designs. Introduction to multiple regression and to analysis of covariance. Use of computer software in the solution of statistical problems. 3 lectures. Prerequisite: Stat 212.

**Stat 321, 322, 323 Statistical Analysis (3) (3) (3)**

Probability and probability distributions for statistical procedures. Statistical techniques based on sampling from normally distributed populations. Regression and correlation, analysis of variance, analysis of covariance, distribution free procedures. Use of computing facilities in the solution of statistical problems. 3 lectures. Prerequisite: Math 132 or 142.

**Stat 324 Applied Regression Analysis (3)**

Simple linear regression, aptness of model, special topics in simple linear regression, multiple linear regression, indicator variables, selection of "best subset", and introduction to non-linear regression models. 3 lectures. Prerequisite: Stat 212 or Stat 252 or Stat 322.

**Stat 330 Statistical Uses of Computers (3)**

Techniques available to the statistician for efficient use of a digital computer to perform statistical computations and to handle large amounts of data. Use of special languages. Analysis of computer software used in the solution of statistical problems. 3 lectures. Prerequisite: Stat 322, CSc 101.

**Stat 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with not more than 2 units in any one quarter. Prerequisite: permission of department head.

**Stat 415 Nonparametric Methods in Statistics (3)**

Hypothesis testing when the form of the parent population is unknown; tests based on Binomial Distribution; measures of dependence; contingency tables; tests based on ranks; Kolmogorov-Smirnov-type tests. 3 lectures. Prerequisite: Stat 212 or 322.

**Stat 421 Sampling Techniques (3)**

Planning, execution, and analysis of sampling from finite populations. Sampling designs and estimation procedures. Nonsampling errors. Questionnaire analysis. Case studies. 3 lectures. Prerequisite: Stat 211 or 321.

**Stat 423 Design of Experiments (3)**

General linear model—a unified approach to various applied methods. Regression, t-test, analysis of variance and covariance; programming statistical problems. Advanced topics in statistical designs; split plot design, confounding, fractional factorial, response surfaces. 3 lectures. Prerequisite: Stat 323.

**Stat 425 Probability Theory and Applications I (3)**

Basic probability theory, conditional and marginal probability, stochastic independence, probability models for random phenomena, probability distributions, mathematical expectation and transformation. 3 lectures. Prerequisite: Stat 321, Math 241.

**Stat 426 Probability Theory and Applications II (3)**

Multivariate normal distribution, sampling distributions, theory of estimation and hypothesis testing. 3 lectures. Prerequisite: Stat 425

**Stat 427 Mathematical Statistics (3)**

Investigation of statistical theory, including the topics of Bayesian inference, regression and linear hypotheses, and sequential analyses. 3 lectures. Prerequisite: Stat 426.

**Stat 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**Stat 463 Undergraduate Seminar (2)**

Reports and discussions by students through seminar methods, based on topics of interest to persons preparing for a career in statistics. Offered only on a credit-no credit basis. 2 activity periods.

**Stat 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: consent of instructor.

**Stat 512 Statistical Methods (3)**

Statistical methods in research for graduate students not majoring in mathematical sciences. Probability distributions, confidence intervals, hypothesis testing, contingency tables, linear regression and correlation. Application of statistics in the student's major field. 3 lectures. Prerequisite: Intermediate algebra or equivalent.

## **THEATRE**

**Th 220 Introduction of Theatre (3)**

The play production process, current and historical, including theatrical terminology, methods, aesthetics and technology. 3 lectures.

**Th 320 Acting (3)**

Basic acting techniques, improvisation, characterization, pantomime and movement. 3 lectures. Prerequisite: Th 220 or consent of instructor.

**Th 321 Directing (3)**

Script analysis, motivation and blocking of action, preparation of the prompt book. Direction of practice scenes. 2 lectures, 1 two-hour laboratory. Prerequisite: Th 220.

**Th 322 Stagecraft (2)**

Scenery design, construction, painting, lighting, costumes, and make-up. 2 two-hour laboratories. Maximum of 6 units may be earned. Prerequisite: Th 220 or consent of instructor.

**Th 327, 328 Theatrical History and Literature (4) (4)**

History of the theatre and correlated studies of representative plays from 500 B.C. to 1660 A.D., and from 1660 A.D. to present. 4 lectures. Prerequisite: Th 220 or consent of instructor.

**Th 331 Rehearsal and Performance (2)**

Preparation of a play for public presentation, including acting, stage management, publicity and house management. Admission to course by audition only. Maximum of 6 units credit may be earned. 2 laboratories.



**Th 347 Children's Drama (3)**

Role-playing, group dramatization, and related activities. For students preparing to teach. 1 lecture, 2 two-hour laboratories.

**Th 422 Stage Scenery and Lighting Design (3)**

Stage scenery and lighting design from the study of the script through the rendering of elevations and the construction and lighting of models. Light and color as used in scenery design. 3 lectures. Prerequisite: Th 220.

**Th 470 Selected Advanced Topics (1-3)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

## **VEGETABLE SCIENCE**

**Vg Sc 230 General Vegetable Crops (4)**

Principles involved in production, harvesting, packaging, and marketing of major California vegetable crops. Survey of the vegetable industry for other than crop science majors. Credit not allowed for both Vg Sc 230 and Vg Sc 232. 3 lectures, 1 laboratory.

**Vg Sc 232 Vegetable Crops Production (4)**

Production, adaptation, utilization of vegetable crops such as cole crops, beans, celery, peppers, squash, melons, cucumbers, lettuce, carrots, spinach, sweet potatoes. A field trip to a major California vegetable production area is required. Credit not allowed for both Vg Sc 230 and Vg Sc 232. 3 lectures, 1 laboratory. Prerequisite: Cr Sc 133.

**Vg Sc 250 Home Vegetable Production (2)**

Practical aspects of growing vegetable crops in the home garden. Seedbed preparation, mulching, composting, transplanting, seeding, irrigation, fertilization and cultural practices utilized in production of vegetable crops. 1 lecture, 1 laboratory.

**Vg Sc 324 Harvesting, Packaging and Marketing Vegetable Crops (4)**

Harvesting methods and procedures; current handling and packaging techniques; containers; storage; and grades, grading and laboratory tests for fresh market vegetables. A field trip to a major California vegetable production, processing or marketing area is required. 3 lectures, 1 laboratory. Prerequisite: Vg Sc 232.

**Vg Sc 326 Advanced Vegetable Production (4)**

Advanced studies of recent developments and problems of vegetable production. Cultural practices associated with mechanization. A field trip to a major California vegetable production area is required. 3 lectures, 1 laboratory. Prerequisite: Vg Sc 232.

**Vg Sc 424 Vegetable Crop Management (4)**

Organization, management, and operation of commercial size vegetable production acreages; advanced work in production, harvesting, marketing operations, and the varied aspects of the entire commercial vegetable production industry. A field trip to a major California vegetable production area is required. 3 lectures, 1 laboratory. Prerequisite: Vg Sc 326.

**Vg Sc 521 Advanced Vegetable Science (4)**

Problems and techniques of vegetable science. Special study projects. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and permission of instructor.

## **VETERINARY SCIENCE**

**VS 099 Principles of Veterinary Science (5)**

Structural aspects and functions of the principal systems of farm animals, control and prevention of common diseases causing economic losses in livestock. 4 lectures, 1 laboratory. To be taken by technical students only, in substitution for VS 123, 302 and 203. Not open to degree students for degree credit. Prerequisite: Bio 099 or 101.

**VS 123 Anatomy and Physiology (3)**

Structural aspects and the normal functions of the principal systems of the various farm animals. 2 lectures, 1 laboratory. Prerequisite: Zoo 131, 132.

**VS 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

**VS 203 Animal Parasitology (3)**

Identification, life cycles, prevention and control of the common external and internal parasites causing economic loss in livestock. 3 lectures. Prerequisite: Zoo 131, 132.

**VS 206 Laboratory Animal Care (3)**

Applied principles involving care and management of laboratory farm animals, veterinary principles involving the care of animals with injury and disease. 3 lectures. Prerequisite: VS 123.

**VS 302 Animal Hygiene (3)**

Basic disease concepts, transmission of infectious diseases, fundamentals of immunology. Infectious disease preventive principles. The livestock producer's role and responsibilities in governmental farm animal disease control programs. 3 lectures. Prerequisite: Bact 221.

**VS 310 Zoonosis (2)**

A study of some of the common diseases of domestic animals and birds which can be transmitted to man. 2 lectures. Prerequisite: Zoo 131, Bact 221.

**VS 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Prior permission of department head.

**VS 438 Systemic Animal Physiology (4)**

Homeostatic relationships of organ systems. Cardiovascular, respiratory, urogenital and neuro-endocrinological functions. 3 lectures, 1 laboratory. Prerequisite: Zoo 132, Chem 328. Recommended: Chem 126, Chem 329, Bjo 431, and/or VS 123 and Zoo 133.

**VS 522 Seminar in Disease Problems (2)**

Livestock disease problems related to national and international animal health. Familiarization with governmental prevention, control, and eradication programs. State and federal regulations relating to importation and exportation of livestock. 2 lectures. Prerequisite: VS 302.

## **ZOOLOGY**

**Zoo 131 General Zoology (4)**

Cells, tissues, and organ systems of vertebrates; emphasis on man and domestic animals. 2 lectures, 2 laboratories.

**Zoo 132 General Zoology (4)**

Embryology, genetics, taxonomy, economic zoology, ecology and evolution. 2 lectures, 2 laboratories. Prerequisite: Zoo 131.

**Zoo 133 General Zoology (4)**

The variety, structure and distribution of invertebrate animals. 2 lectures, 2 laboratories. Prerequisite: Zoo 132.

**Zoo 237, 238, 239 Human Anatomy and Physiology (3) (3) (3)**

Morphology of man. Functions of the various organ systems of man with appropriate laboratory experiments. Zoo 237 not open for credit to students who have completed Zoo 326, Comparative Anatomy. 2 lectures, 1 laboratory. Prerequisite: Zoo 131, elementary chemistry.

**Zoo 303 Vertebrate Embryology (3)**

The developmental processes from the egg to the formation of the body and the establishment of the principal organs and systems. 3 lectures. Prerequisite: Zoo 132.

**Zoo 304 Vertebrate Embryology Laboratory (2)**

Study of the developmental anatomy of selected stages of the frog, chick and pig. Demonstrations and exercises in the preparation of embryonic materials for study purposes. 2 laboratories. Prerequisite: Zoo 303 (may be taken concurrently).

**Zoo 321 Mammalogy (4)**

Identification, biology and economic importance of mammals, with special reference to California species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129.

**Zoo 322 Ichthyology (4)**

Identification, physiology, anatomy, and behavior of marine and freshwater fishes with special reference to local and economically important species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132.

**Zoo 323 Ornithology (4)**

Classification, anatomy and physiology, ecology and behavior, and economic importance of birds. Four Saturday field trips required. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129.

**Zoo 324 Zoo Biology (3)**

Wild animals in captivity; principles and problems of maintaining them for recreational, educational and scientific purposes. 3 lectures. Prerequisite: 1 year of biology or zoology.

**Zoo 326 Comparative Anatomy of the Vertebrates (5)**

Comparative structure of vertebrate organ systems. 3 lectures, 2 laboratories. Prerequisite: Zoo 132. Recommended: Zoo 303 and Zoo 304.

**Zoo 329 Vertebrate Field Zoology (4)**

Identification and natural history of terrestrial vertebrates, with emphasis on field studies and local species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129.

**Zoo 336 Invertebrate Zoology (4)**

Study of invertebrate groups of animals with emphasis on taxonomy, morphology, distribution and economic importance. 2 lectures, 2 laboratories, and field work. Prerequisite: Zoo 133 or Bio 129.

**Zoo 340 Human Muscle Anatomy (2)**

Study of the muscles of a human cadaver. 1 lecture, 1 laboratory. Prerequisite: Zoo 237 (may be taken concurrently).

**Zoo 341 Herpetology (4)**

Living and extinct reptiles and amphibians; an adaptive approach to their diversity, biology, and classification. 2 lectures, 2 laboratories. Prerequisite: Zoo 132.

**Zoo 412 Introduction to Clinical Pathology (3)**

Malignant, deficiency, degenerative and other non-infectious diseases from the standpoint of etiology, manifestations and laboratory findings. 3 lectures. Prerequisite: Chem 328, Zoo 239 or Bio 431.

**Zoo 422 Histology (4)**

Functional microscopic anatomy of principal tissues and organs of vertebrates. 2 lectures, 2 laboratories. Prerequisite: Zoo 132.

**Zoo 425 Parasitology (4)**

External and internal parasites of man and animals; life history; parasite-host relationships; control and recognition of species of clinical importance. 2 lectures, 2 laboratories. Prerequisite: Zoo 132. Recommended: Zoo 133.

**Zoo 426 Serology and Immunology (4)**

Nature of innate and acquired immune reactions: theory and techniques of serological methods in diagnosing disease. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor.

**Zoo 428 Hematology (4)**

Microscopic and chemical examination of blood. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor. Recommended: Zoo 426.

**Zoo 432 Physiology II: Comparative Systems (4)**

Physiological mechanisms involved in osmotic and ionic regulations, digestion, circulation, respiratory energetics and thermal acclimation. Laboratory experiments in physiological processes and their ecological importance. 2 lectures, 2 laboratories. Prerequisite: Bio 431.

**Zoo 433 Physiology III: Endocrine and Reproductive (4)**

Introduction to the endocrine and reproductive systems of vertebrate animals. Course will include not only classical actions of hormones but also mechanisms of hormone action, relationship between nervous and endocrine systems, hormone bioassay, and selected clinical aspects of endocrinology. 3 lectures, 1 laboratory. Prerequisites: Zoo 132 and Bio 431.

**Zoo 437 Animal Behavior (4)**

Behavioral adaptations of animals to their environment and way of life. Analysis of behavior patterns, use of patterns in clarifying evolutionary and ecological relationships. 3 lectures, 1 laboratory. Prerequisite: Zoo 132 (Bio 315 and Bio 325 recommended).

**Zoo 524 Functional Vertebrate Morphology (3)**

Discussion and critical evaluation of selections from the modern anatomical literature. Locomotor and feeding mechanisms. Dissections of skeleto-muscle mechanisms. 1 lecture, 2 laboratories. Prerequisite: Zoo 326 or consent of instructor. Recommended: Zoo 329.

**Zoo 530 Behavioral Ecology (3)**

An intensive study of the function and evolution of behavioral phenomena as they relate to ecological phenomena. Topics covered include: habitat selection; spacing mechanisms; reproductive strategies; feeding strategies; agonistic, parasitic, and altruistic behavior; migration; and comparative social systems. 3 lectures. Prerequisites: Graduate standing, Bio 325 or Bot 326, Zoo 437. Recommended: Bio 315, Psy 304.

# Directories





# CALIFORNIA POLYTECHNIC STATE UNIVERSITY SAN LUIS OBISPO

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Agricultural Engineering .....	Jack D. Wilson
Agricultural Management .....	Edgar A. Hyer
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Crop Science .....	Corwin M. Johnson
Dairy Science .....	Eugene E. Starkey
Food Science .....	Robert D. Vance
Natural Resources Management .....	Marvin J. Whalls
Ornamental Horticulture .....	Ronald D. Regan
Poultry Industry .....	Robert A. Voitle
Soil Science.....	C. Dean Piper
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Construction.....	James A. Rodger (Acting)
Landscape Architecture.....	John F. Gillham (Acting)

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Environmental Engineering .....	Walter E. Holtz
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Mechanical Engineering .....	Raymond G. Gordon
Metallurgical Engineering .....	Richard C. Wiley

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Social Sciences .....	Robert L. Hoover

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## FACULTY EMERITI

(Dates indicate period of service)

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* * * * *	
John K. Allen (1952-1970) .....	Veterinary Science
Olive M. Andersen (1957-1972) .....	Mathematics
Roy E. Anderson (1949-1978) .....	Business
Warren R. Anderson (1946-1979) .....	Electronic and Electrical Engineering
John H. Applegarth (1952-1972) .....	Biological Sciences
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Lyman L. Bennion (1938-1967) .....	Animal Husbandry
Joy G. Berghell (1956-1975) .....	Library
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Ralph O. Bille (1948-1965) .....	Agricultural Engineering
Chester O. Bishop (1957-1973) .....	Metallurgical Engineering
Emmett A. Bloom (1946-1974) .....	Animal Science
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Woodford E. Bowls (1937-1973) .....	Physics
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Gene E. Brendlin (1950-1971) .....	Farm Management
J. Philip Bromley (1947-1973) .....	Agricultural Management
Marvin D. Brown (1956-1963, 1974-1976) .....	English
L. LaVerne Bucy (1955-1978) .....	Animal Science
H. H. Burlingham (1948-1972) .....	Agricultural Education
Arthur G. Butzbach (1950-1970) .....	Education
James H. Carrington (1943-1967) .....	Agricultural Engineering
Logan S. Carter (1947-1970) .....	Soil Science
Marjorie Cass (1957-1974) .....	Education
Everett M. Chandler (1951-1977) .....	Dean of Students
Daniel C. Chase (1954-1979) .....	Agricultural Management
Ralph C. Collins (1955-1974) .....	Education
Spelman B. Collins (1940-1968) .....	Animal Husbandry
David W. Cook (1941-1977) .....	Mathematics and Associate Dean of Curriculum and Instruction
A. Norman Cruikshanks (1947-1971) .....	Social Sciences
James T. Culbertson (1953-1977) .....	Philosophy
Bruce A. Dickson (1952-1978) .....	Soil Science
Ralph W. Dilts (1944-1973) .....	History
Wesley T. Dunn (1959-1974) .....	Graphic Communications
Charles A. Elston (1947-1973) .....	Mathematics
Oswald J. Falkenstern (1953-1977) .....	Mathematics
Volmar A. Folsom (1946-1975) .....	Mathematics
Millard J. Fötter (1954-1976) .....	Industrial Engineering
George S. Furmisky (1955-1973) .....	Engineering Technology
Vincent J. Gates (1958-1977) .....	Journalism
J. Cordner Gibson (1949-1976) .....	Agricultural Education and Dean of Agriculture and Natural Resources
C. Herold Gregory (1950-1970) .....	Printing Technology and Management
Lester W. Gustafson (1947-1971) .....	Aeronautical Engineering
Richard E. Hall (1946-1977) .....	Engineering Technology
Anatol Helman (1957-1974) .....	Architecture
Harold J. Hendricks (1952-1978) .....	Electronic and Electrical Engineering
Charles A. Herald (1958-1975) .....	Electronic and Electrical Engineering
George E. Hoffman (1956-1979) .....	Industrial Engineering
Wilbur C. Hogan (1959-1973) .....	Philosophy
Ray J. Holt (1955-1978) .....	Physics

Gilbert L. Homfield (1960-1976)	Mathematics
A. L. Houk (1946-1972)	Chemistry
LeRoy B. Hughes (1950-1971)	Physical Education
James J. Jensen (1948-1973)	Physical Education
Robert M. Johnston (1946-1954) (1956-1974)	Engineering Technology
Edward J. Jorgensen (1947-1976)	Physical Education
Erna Bowman Knapp (1962-1977)	Art
C. E. Knott (1921-1959)	Mechanical Engineering and Dean of Engineering
Russell Korsmeyer (1958-1978)	Electronic and Electrical Engineering
Alexander N. Landyshev (1956-1972)	Electronic and Electrical Engineering
James A. Langford (1955-1976)	Education
Paul S. Lansman (1964-1979)	Mathematics
John D. Lawson (1951-1978)	Director of Activities Planning
Richard I. Leach (1930-1971)	Poultry Industry
Vance D. Lewis (1946-1972)	Physics and Associate Dean, Science and Mathematics
John H. Manning (1956-1975)	Mathematics
Ena L. Marston (1946-1970)	English
M. C. Martinsen (1915-1957)	Aeronautical Engineering
Theodore Matthew (1948-1962)	Chemistry
C. O. McCorkle (1932-1960)	Agricultural Economics and Dean of the College
James M. McGrath (1946-1975)	Engineering Technology
George H. McMeen (1960-1977)	Mathematics
Mac McRobbie (1962-1979)	Industrial Technology
John L. Merriam (1958-1978)	Agricultural Engineering
Robert A. Mott (1946-1978)	Physical Education
Billy W. Mounts (1956-1977)	Physician and Surgeon and Director of Health Center
Glenn A. Noble (1947-1973)	Biological Sciences
Thomas F. Nolan (1949-1974)	Political Science
Howard R. O'Daniels (1938-1971)	Business Administration
Philip H. Overmeyer (1958-1972)	Business Administration
Willard M. Pederson (1961-1977)	English
Clifford J. Price (1956-1974)	Aeronautical Engineering
John B. Rapp (1959-1979)	Mechanical Engineering
Evelyn D. Reagan (1946-1948, 1954-1977)	Library
Oscar E. Reece (1956-1973)	Crop Science
R. Howell Reece (1946-1964)	Mechanical Engineering
R. Wallace Reynolds (1953-1979)	Engineering Technology
Glenn W. Rich (1953-1979)	Agricultural Engineering
Carlos C. Richards (1946-1971)	Engineering Technology
Torleif M. Rickansrud (1944-1969)	Physics
Eugene A. Rittenhouse (1949-1976)	Economics and Director of Placement
Leo E. Rogers (1954-1978)	Engineering Technology
Harry H. Scales (1958-1976)	Education
Chester H. Scott (1952-1978)	Mathematics
Glenn E. Seeber (1954-1979)	Engineering Technology
Vard M. Shepard (1932-1960)	Animal Husbandry and Dean of Agriculture
M. Eugene Smith (1946-1974)	History
Warren T. Smith (1952-1973)	Dean of Agriculture
Fred H. Steuck (1947-1978)	Electronic and Electrical Engineering
Ellen T. Stookey (1961-1978)	Home Economics
L. Harry Strauss (1961-1976)	Director of Library
Harmon B. Toone (1952-1977)	Dairy and Poultry Science
Dean Trembly (1961-1976)	Counseling
William R. Troutner (1942-1976)	Crop Science
Pearl Turner (1951-1974)	Library
Evelyn K. Voros (1955-1974)	Speech
Ralph E. Weston (1948-1967)	Mathematical Sciences
Omer K. Whipple (1956-1976)	Chemistry

Francis F. Whiting (1946–1970)	Engineering Technology
Milo E. Whitson (1947–1974)	Mathematics
J. Barron Wiley (1956–1978)	Education
Irwin A. Willson (1958–1975)	Education
Harold O. Wilson (1936, 1946–1974)	Administrative Vice President
C. Paul Winner (1940–1971)	Agricultural Mechanics
Arthur D. Wirshup (1952–1977)	Mathematics
John A. Woodworth (1949–1974)	Mathematics
Lloyd J. Work (1958–1978)	Physics
Dorothy S. Wright (1946–1966)	Librarian

### DISTINGUISHED TEACHER AWARD RECIPIENTS

In 1963 the University instituted a program of recognizing outstanding teaching efforts through the Distinguished Teacher Awards. Selections for this honor are based upon recommendations of the Academic Senate committee which follows the procedure of soliciting nominations from students and colleagues. Evaluations and subsequent recommendations of the nominees are based upon an in-depth review by the committee, including classroom visitations. Recipients of the Distinguished Teacher Awards and their departments since the inception of the program are listed below.

- 1963–64 Robert E. Holmquist, Physics  
John L. Merriam, Agricultural Engineering
- 1964–65 Joy O. Richardson, Mechanical Engineering  
Milo E. Whitson, Mathematics
- 1965–66 A. Norman Cruikshanks, Social Sciences  
Richard F. Johnson, Animal Husbandry  
George R. Mach, Mathematics
- 1966–67 Robert W. Adamson, Mechanical Engineering  
Kenneth G. Fuller, Mathematics  
William D. Curtis, Psychology
- 1967–68 Rodney G. Keif, Environmental Engineering  
David M. Grant, English  
Wesley S. Ward, Architecture
- 1968–69 Robert M. Johnson, Mechanical Engineering  
Bruce Kennelly, Chemistry  
Alice E. Roberts, Education
- 1969–70 Donald W. Hensel, History  
David H. Montgomery, Biological Sciences  
Philip H. Overmeyer, Business Administration  
Willard M. Pederson, English  
Omer K. Whipple, Chemistry
- 1970–71 Robert L. Cleath, Speech  
Kenneth E. Schwartz, Architecture  
Hewitt G. Wight, Chemistry
- 1971–72 Stuart E. Larsen, Aeronautical Engineering  
Barton C. Olsen, History  
Ronald L. Ritschard, Biological Sciences  
Joseph N. Weatherby, Social Sciences
- 1972–73 Lyle G. McNeal, Animal Science  
Charles W. Quinlan, Architecture  
James E. Simmons, English
- 1973–74 William J. Phaklides, Engineering Technology  
Louis D. Pippin, Education  
Duane O. Seaberg, Agricultural Management
- 1974–75 Peter Jankay, Biological Sciences  
Josephine S. Stearns, Child Development  
George J. Suchand, Social Sciences
- 1975–76 James Hayes, Journalism  
William V. Johnson, Music  
Erna Knapp, Art

- 1976-77 Harry L. Fierstine, Biological Sciences  
 Grant D. Venerable II, Chemistry  
 Ralph M. Warten, Mathematics  
 1977-78 Timothy M. Barnes, History  
 Donald P. Grant, Architecture and Environmental Design  
 John C. Syer, Political Science

## STAFF EMERITI

(Dates indicate period of service)

Vic Allen (1951-1976)	Business Affairs
Fern Ballard (1954-1974)	Foundation
Jack Bertram (1952-1972)	Foundation
Leona M. Boerman (1944-1967)	President's Office
Harold A. Burnett (1962-1977)	Food Industries
Cyrus E. Casady (1950-1974)	Business Affairs
George W. Cockriel (1957-1977)	Business Affairs
Loretta I. Costen (1953-1976)	Business Affairs
Richard T. Crosby (1949-1971)	Business Affairs
Donald J. Curtis (1960-1976)	Student Affairs
Roy E. Darr (1953-1971)	Business Affairs
Lloyd G. Dietrich (1953-1973)	Business Affairs
Paul S. Dillon (1947-1971)	Foundation
Colier Duncan (1955-1977)	Business Affairs
Lloyd R. Evans (1959-1978)	Business Affairs
Patricia A. (Eilers) Farrow (1957-1972)	Student Affairs
Juanita A. Fredericks (1954-1974)	Foundation
Lena Gianolini (1949-1972)	Business Affairs
Gertrude Gladin (1957-1972)	Student Affairs
Ruth Gran (1957-1975)	Student Affairs
Margaret Green (1960-1977)	Foundation
Mary Lee Green (1948-1976)	Foundation
Joseph C. Hampl (1943-1971)	Foundation
Francine Hapgood (1951-1976)	Business Affairs
Raymond T. Hesse (1948-1972)	Business Affairs
Clara Huffman (1959-1974)	Foundation
Viola E. Hughes (1956-1978)	Student Affairs
Marie (Williams) Janolis (1962-1977)	Engineering and Technology
Mary Johnson (1950-1976)	Business Affairs
Edwin Koch (1961-1976)	Foundation
Lois L. Larson (1962-1978)	Student Affairs
John Lee (1960-1975)	Foundation
James Mapes (1961-1977)	Business Affairs
Lionel Middlecamp (1942-1976)	Agriculture and Natural Resources
Valdora Myers (1960-1978)	Student Affairs
Harold A. Nash (1947-1974)	Business Affairs
Donald S. Nelson (1943-1971)	Director, Business Affairs
Margaret Nelson (1959-1977)	Student Affairs
Lee Owen (1946-1978)	Business Affairs
Alfred J. Pelucca (1956-1971)	Business Affairs
Charles O. Penwell (1946-1971)	Foundation
Rubin Rutschke (1959-1977)	Business Affairs
Lucy Schmidt (1956-1972)	Business Affairs
Ralph Schurtz (1949-1973)	Business Affairs
Jean Steck (1960-1975)	Business Affairs
Merlin Ward (1946-1974)	Business Affairs
Boyd Wettlaufer (1960-1976)	Audio Visual
Alfred Wilcox (1960-1975)	Business Affairs
Frank H. Wyman (1956-1972)	Business Affairs

# FACULTY AND STAFF

(Number in parentheses indicates year of appointment)

Listed as of May 1979

- ABITIA, FRED** (1969) ..... Industrial Technology  
B.A., San Jose State College, 1964; M.A., 1966; Ed.D., Washington State University, 1971.  
Professor.  
Experience: Technician, Engineering Department, San Jose State College; teacher, Abraham Lincoln High School, San Jose; instructor, San Jose State College; assistant professor, Chico State College; assistant professor, Washington State University; draftsman, U.S. Navy.
- ABSHIRE, FRANKLIN P.** (1977) ..... Engineering Technology  
B.S., Arizona State University, 1969; M.S., 1974. Associate Professor.  
Experience: Bell Telephone Labs, Mountain Bell Telephone, DeVry Institute of Technology, Phoenix College, Hewlett Packard
- ADAMS, JOHN P., JR.** (1970) ..... Economics  
M.A., Claremont Graduate School, 1968; Ph.D., 1972. Professor.  
Experience: Military assistance plans officer, JUSMAG—Thailand; advisor to Directorate of Operations, Royal Thai Army; instructor, California State Polytechnic College, Kellogg-Voorhis; staff associate/director, Claremont Manpower Institute, Claremont Graduate School; U.S. Army.
- ADAMS, STEPHEN H.** (1974) ..... Program Manager, Associated Students, Inc.  
B.S., Southern Illinois University, Edwardsville, 1969; M.S., Kansas State University, 1973.  
Experience: Assistant director, campus center, Susquehanna University; activities program advisor, Kansas State University; food service, Southern Illinois University.
- ADAMSON, ROBERT W.** (1953) ..... Mechanical Engineering  
B.S., Ch.E., Tulane University, 1941; M.S., Ch.E., Oregon State College, 1948. Professor.  
Experience: Petroleum refinery engineer, Standard Oil Company of New Jersey; instructor, Oregon State College; research assistant, industrial sales engineer, Union Oil Company of California. Registered professional engineer, California.
- AIKEN, JAMES L.** (1970) ..... Counselor  
B.A., University of Florida, 1964; M.Ed., 1965; Ph.D., Missouri University, 1970.  
Experience: Counselor, St. Johns River Junior College, Florida; psychologist, Counseling and Testing Service, assistant professor, University of Texas; assistant professor, New Jersey College of Medicine and Dentistry; coordinator of counseling, University of California, Santa Cruz.
- ALEXANDER, WILLIAM M.** (1958) ..... Political Science  
B.S., Oregon State University, 1949; M.S., 1951; M.A., Pennsylvania State University, 1953; Ph.D., University of Oregon, 1962; additional graduate study, University of Stockholm, George Washington University, University of Georgia. Professor.  
Experience: Management assistant, U.S. Geological Survey; teaching fellow, University of Oregon; instructor, Oregon State University; Fulbright professor of political science, India.
- AL-HADAD, SABAH** (1965) ..... Mathematics  
B.S., Texas Technological College, 1960; M.A., California State Polytechnic College, 1962; Ed.D., Arizona State University, 1972. Associate Professor.  
Experience: Director, Ministry of Agricultural Development, Baghdad, Iraq.
- ALLEN, RAY R.** (1955) ..... Engineering Technology  
B.A., Santa Barbara State College, 1942; M.A., California State Polytechnic College, 1965; additional graduate study, University of Southern California. Professor.  
Experience: Chemist, Ventura Coastal Lemon Co.; technician, U.S. Air Force; instructor, U.S. Naval Air Technical Training Center; engineer, Carpinteria Fire District; consultant, USAID, Africa.

- AMANZIO, JOSEPH C. (1971)** ..... Architecture  
B. Arch., University of Florida, 1967; M. Arch. & Urban Design, Washington University, 1974. Associate professor.  
Experience: Lecturer, University of Strathclyde, Glasgow, Scotland; visiting foreign lecturer, Regional College of Art, Hull, England; teaching assistant, Washington University; designer, Greenleaf and Telesca, Architects and Engineers; designer-draftsman, Watson, Deutschman and Kruse, Architects and Engineers; draftsman, campus architect, University of Florida.
- AMARAL, ALFRED W. (1967)** ..... Executive Director, Foundation  
B.S., California State Polytechnic College, 1964; M.B.A., Golden Gate College, 1970.  
Experience: Assistant manager, G. L. Soares Labor Contractor; assistant sales manager, Martin Produce, Inc.; agricultural representative, Wells Fargo Bank; instructor, Agricultural Management, California Polytechnic State University.
- AMATO, ANTHONY J. (1955)** ..... Ornamental Horticulture  
B.S., California State Polytechnic College, 1949; graduate study, California Polytechnic State University. Professor.  
Experience: Instructor, Mt. San Antonio Junior College, Pomona; Oakland Junior College; landscape architect and contractor, Walnut Creek; officer, U.S. Air Force.
- AMEDEE, GASTON (1976)** ..... Soil Science  
B.S., University of Haiti, 1963; M.S., University of Connecticut, 1971; Ph.D., Cornell University, 1974. Assistant Professor.  
Experience: Postdoctoral research associate, Cornell University; graduate research and teaching assistant, University of Connecticut and Cornell University; chemical technician, Felton International, New York.
- ANDERSON, ELIZABETH B. (1958)** ..... English  
B.S., Ohio University, 1938; M.A., California Polytechnic State University, 1959; additional graduate study, University of California, Santa Barbara. Associate Professor.  
Experience: Reporter and feature writer, Athens Messenger, Ohio; copywriter, Cleveland Press, Ohio; advertising department, General Electric Company, Bridgeport; free-lance writing.
- ANDERSON, PATRICIA J. (1978)** ..... Registered Nurse  
R.N., St. Mary's School of Nursing, Illinois.  
Experience: Supervisor, Lompoc Community Hospital; general duty nurse, Hartford Memorial, Maryland, and Sierra Vista Hospital, San Luis Obispo.
- ANDERSON, RICHARD A. (1947)** ..... Physical Education  
B.S., University of Southern California, 1942; M.S., 1947; additional graduate study, University of California, Los Angeles. Professor.  
Experience: Playground director, Los Angeles Playground and Recreation Department; officer, U.S. Navy; swimming pool director, South Pasadena; assistant instructor in physical education and assistant swimming coach, University of Southern California.
- ANDERSON, RUSSELL K. (1955)** ..... Animal Science  
B.S., University of Minnesota, 1948; M.S., Iowa State College, 1950; Ph.D., 1956. Professor.  
Experience: U.S. Air Force; instructor, Iowa State University.
- ANDOLI, FREDERICK P. (1968)** ..... Biological Sciences  
B.A., Upsala College, 1963; M.S., Utah State University, 1968; D.A., Idaho State University, 1974. Associate Professor.  
Experience: Teaching assistant, Upsala College, Utah State University; research supervisor, Army Chemical Corps.
- ANDRE, BARBARA R. (1973)** ..... Associate Director of Housing  
B.A., Humboldt State University, 1969; M.A., California Polytechnic State University, 1971.  
Experience: Student affairs intern, California Polytechnic State University; rehabilitation counselor, New Horizons Workshop, Northridge.

- ANDREINI, ROBERT L. (1954) ..... Speech Communication  
B.A., Stanford University, 1941; M.A., 1949; additional graduate study, University of California, Berkeley, Teachers College, Columbia University. Professor.  
Experience: U.S. Air Force; Royal University of Pisa, Italy; teacher, California high schools.
- ANDREOLI, ALFRED E. (1963) ..... Aeronautical Engineering  
B.S., University of Colorado, 1954; M.S., California Institute of Technology, 1956; additional graduate study, University of Colorado. Professor.  
Experience: Test engineer, aerodynamicist, Northrop Aircraft; assistant professor, Los Angeles State College; teaching associate, University of Colorado.
- ANDRESEN, JAMES G. (1956) ..... Mechanical Engineering  
B.S., California State Polytechnic College, 1956, M. Engr., 1979. Assistant Professor.  
Experience: U.S. Army.
- ANDREWS, CHARLES T. (1972) ..... Head, Accounting Department  
B.S., Eastern Illinois University, 1960; M.B.A., Bowling Green State University, 1963; D.B.A., Indiana University, 1968. Professor.  
Experience: Associate dean, Creighton University; assistant professor, University of Missouri, Columbia; faculty lecturer, Indiana University; instructor, Elmhurst College; accountant, Marathon Oil Co.; C.P.A., Indiana.
- ANDREWS, DALE W. (1950) ..... Executive Vice President  
B.S., University of California, Davis, 1941; M.A., California State Polytechnic College, 1952; Ph.D., University of Minnesota, 1957.  
Experience: Director of agriculture and supervising teacher, Merced Union High School, Arroyo Grande Union High School; officer, U.S. Marine Corps; agricultural teacher trainer, instructional materials coordinator, and special educational services coordinator, Dean of the College, Vice President, Academic Vice President, Acting President, California Polytechnic State University; Danforth associate.
- APFELBERG, HERSCHEL L. (1971) ..... Graphic Communications  
B.S., Rochester Institute of Technology, 1965; M.A., California Polytechnic State University, 1973. Associate Professor.  
Experience: Printing superintendent, Equitable Bag Company; process engineer and roto-gravure administrator, American Can Company; compositor and linotype operator, Gannett Company, Inc.
- APODACA, EDUARDO A. (1973) ..... Communications/Media Productions  
B.A., University of Texas at El Paso, 1963; M.S., University of Southern California, 1979.  
Experience: Communications specialist, U.S. Agency for International Development/Cal Poly/Guatemala Project; associate director, Bay Area Bilingual Education League; director, Bilingual Education, Riverside County Schools; associate director, Title III, Desert Center; intermediate and secondary school teacher.
- ARMENTROUT, WILLIAM W. (1953) ..... Coordinator, Credential Advisement  
and Teacher Candidate Selection  
B.J., University of Missouri, 1939; A.B., Colorado State College of Education, 1940; M.A., Columbia University, 1940; Ed.D., Stanford University, 1953. Professor.  
Experience: Guidance counselor, Menlo School and College; associate registrar, Stanford University; test officer, assistant to Dean of Arts and Sciences, coordinator secondary education, California Polytechnic State University; U.S. Air Force.
- ARMSTRONG, GENE A. (1970) ..... Animal Science  
B.S., California Polytechnic State University, 1972. Associate Professor.  
Experience: Self-employed horseshoer and horse trainer.
- ARNOLD, SHARON H. (1977) ..... Library  
B.A., University of California, Santa Barbara, 1963; M.L.S., University of Hawaii, 1974; M.A., Pepperdine University, 1976. Assistant Librarian.  
Experience: Reference librarian, California Polytechnic State University; intern, Graduate School of Library Science, Honolulu Community College.

- ASBURY, ROBERT F., JR. (1964)** ..... Architecture  
B.S., University of Kansas, 1954; M. Arch., 1961; M.Ed., University of Hawaii, 1973. Professor.  
Experience: Assistant professor, University of Kansas; designer-draftsman, various architectural firms; U.S. Air Force. Registered Architect, Kansas.
- ATLEE, CHARLES B., JR. (1969)** ..... Crop Science  
B.S., Pennsylvania State University, 1950; M.S., University of California, Davis, 1962. Professor.  
Experience: Farm adviser, University of California Agricultural Extension Service, Santa Cruz and Monterey Counties; horticulture adviser, U.S. Agency for International Development, Guatemala.
- ATRE, SHARAD D. (1974)** ..... Architecture  
B. Arch.; University of Baroda, India, 1963; B. Arch., (second professional degree) Washington University, 1965; M. Arch./Urban Design, University of Colorado, 1973. Associate Professor.  
Experience: Design faculty, University of Colorado; designer/Hellmuth, Obata & Kassabaum, Architects, St. Louis; architect, Wm. Heinzman & Associates, Architects, Boulder; urban designer, C. E. Gathers & Associates, Denver; architect/designer, R. G. Irwin & Associates, Denver; architect, Community Design Center, Denver; recipient Travelling Fellowship, American Institute of Architects, Colorado.
- ATTALA, EMILE E. (1970)** ..... Head, Computer Science and Statistics Department  
B.S., Cairo University, Egypt, 1958; M.S., University of California, Berkeley, 1964; Ph.D., University of California, Santa Barbara, 1974. Professor.  
Experience: Engineer, Shell Oil Company; software system analyst, Autonetics; senior programmer, Astrodata Inc.; senior software system analyst, TRW Systems Group; visiting professor, University of California, Santa Barbara, and Harvard University.
- ATWOOD, LINDA (1974)** ..... Chemistry  
B.A., Bard College, 1968; M.A., Wesleyan University, 1973; Ph.D., 1974. Associate Professor.  
Experience: Teacher, Hudson Junior High School; teaching assistant, Wesleyan University.
- AVEY, RENNY J. (1973)** ..... Agricultural Management  
B.S., California Polytechnic State University, 1969; M.S., Oregon State University, 1972; Ph.D., University of Hawaii, 1974. Associate Professor.  
Experience: Cattle ranching, agricultural statistician, California Crop and Livestock Reporting Service, Sacramento; graduate research assistant, Oregon State University, University of Hawaii.
- BABB, JAMES H. (1959)** ..... Graphic Communications  
Experience: Printing industry, owner, Visalia Printing Service; special training and lab experience, U.S. Navy Aerial Torpedo Testing Station, Whidby Island, Washington. Assistant Professor.
- BABOS, PARASCHOS (1972)** ..... Biological Sciences  
B.S., Birmingham University, England, 1960; Ph.D., London University, England, 1962. Associate Professor.  
Experience: Assistant professor, Edinburgh University, Scotland; head of virus laboratory, Benaki Institute, Athens, Greece; research associate, research assistant professor, assistant professor, Washington University, St. Louis.
- BABOW, IRVING P. (1971)** ..... Social Sciences  
A.B., University of California, Berkeley, 1936; Ph.D., 1954. Professor.  
Experience: Research director, San Francisco Civil Rights Inventory; research director, San Francisco Community Health and Rehabilitation Study; study director, Alameda County Mental Health Study, California Cancer Patient Study; research sociologist, U.S. Public Health Service; instructor, Golden Gate College; lecturer and acting assistant professor, University of California, Berkeley; research social scientist, California Department of Mental Hygiene.



- BACHMAN, ALFRED M. (1970)** ..... Mathematics  
B.S., Oregon College of Education, 1952; M.Ed., 1960, M.S., 1964; Ph.D., University of Oregon, 1968. Associate Professor.  
Experience: Associate professor, California State College, Fullerton; visiting professor, Temple University; assistant professor, Lane Community College; assistant professor, Portland State University; elementary and high school teaching.
- BACKER, WILLIAM R. (1977)** ..... Engineering Technology  
B.M.E., Rensselaer Polytechnic Institute, 1949; M.S., Massachusetts Institute of Technology, 1950. Associate Professor.  
Experience: Director of engineering, Moore-Oregon; manager of research and engineering, Machine Tool Division, Norton Company; senior research engineer, Cincinnati Milacron; senior tool engineer, Boeing Airplane Company; engineer, Linde Division, Union Carbide Corporation; lecturer, Central Oregon College, Worcester Polytechnic Institute. Registered professional engineer, California and Massachusetts.
- BAGNALL, JAMES R. (1969)** ..... Architecture  
B.A., Occidental College, 1957; M. Arch., University of California, Berkeley, 1974. Associate Professor.  
Experience: Designer, Robertson Montgomery, San Francisco and James Robertson, Sausalito; exhibit design consultant, The Oakland Museum; private practice, Berkeley; design consultant, Amazing Life Games Co., Sausalito.
- BAILEY, PHILIP S. (1969)** ..... Associate Dean, School of Science and Mathematics  
B.S., University of Texas, 1964; Ph.D., Purdue University, 1969. Professor.  
Experience: Research assistant, University of Texas; instructor and research assistant, Purdue University.
- BAILLIE, ALLAN S. (1978)** ..... Management  
B.S., Ohio University, 1954; M.B.A., University of Washington, 1960; Ph.D., 1978.  
Experience: Faculty, Evergreen State College; director of business research, Eastern Washington State College; lecturer, University of Washington; assistant professor, California State University, Fullerton; area representative, procurement control supervisor, lead engineer, The Boeing Company; applications engineer, Worthington Corporation; management trainee, Wheeling Steel Corporation.
- BAKER, EDWARD H. (1968)** ..... Mechanical Engineering  
B.S., Northwestern University, 1958; M.S., University of California, 1963; Ph.D., Northwestern University, 1965. Professor.  
Experience: Senior technical specialist, North American Rockwell Corporation.
- BAKER, RAYMOND A. (1966)** ..... Housing Manager  
B.S., University of Wisconsin, 1955.  
Experience: Department of the Army General Staff, Washington, D.C.
- BALL, R. WAYNE (1969)** ..... Medical Officer  
M.D., University of Missouri School of Medicine, 1961.  
Experience: Internship, Mercy Hospital, Des Moines; residency, Santa Barbara County Hospital; private practice, Santa Maria; associate director, Student Health Service, California Polytechnic State University; Board Certified American Board of Family Practice.
- BALLEW, THOMAS J. (1975)** ..... Architectural Engineering  
B.S., University of Oklahoma, 1954; M.A., Arizona State University, 1972. Assistant Professor.  
Experience: U.S. Marine Corps; structural engineer, Warren Sullivan; architectural engineer, Phillips Petroleum Co.; civil and structural engineer, W. T. Hamlyn; vice president, Engineers Testing Laboratories; architect and engineer, Busby Associates; professor, Arizona State University. Professional registration, California: civil engineer, architect; Arizona: civil engineer, structural engineer, architect.

- BALTHASER, LAWRENCE H. (1969)** ..... Physics  
B.A., Rutgers University, 1960; M.A., Indiana University, 1963; Ph.D., 1969. Professor.  
Experience: Map draftsman, Sun Oil Company; field assistant, New Jersey Agricultural Experiment Station; teaching assistant, Indiana University; assistant professor, Southampton College.
- BANKS, BERNARD W. (1969)** ..... Mathematics  
B.A., San Diego State College, 1964; M.S., 1967; Ph.D., Oregon State University, 1975. Associate Professor.  
Experience: Pilot officer, Royal Air Force; engineering aid, Aeroflex Corp.; tutor, National Science Foundation; mathematician, Naval Undersea Warfare Center; teaching assistant and lecturer, San Diego State College.
- BARNES, TIMOTHY M. (1969)** ..... History  
B.A., University of New Mexico, 1965; M.A., 1966; Ph.D., 1970. Associate Professor.  
Experience: Instructor, University of Albuquerque; graduate assistant, University of New Mexico.
- BARR, STANLEY L. (1959)** ..... English  
B.A., St. Bernardine of Siena College, 1953; M.A., University of Michigan, 1955; additional graduate study, University of Wisconsin, Harvard University, University of Oregon. Associate Professor.  
Experience: Teacher, Michigan Public Schools; assistant professor, Lakeland College; instructor, Wisconsin State College, Whitewater.
- BARROWS, ROBERT S. (1970)** ..... Counselor  
B.S., University of New Hampshire, 1959; M.Ed., State University of New York at Buffalo, 1965; Ed.D., State University of New York at Albany, 1970.  
Experience: Counselor, Urban Center, State University of New York; visiting professor, State University College, Oneonta, New York; teaching assistant, State University of New York at Albany; counselor, secondary schools, Wappingers Falls, New York; teacher of agriculture, Poland, New York; U. S. Navy.
- BARTHELS, KATHERINE M. (1978)** ..... Physical Education  
B.S., University of California, Los Angeles, 1961; M.S., University of California, Santa Barbara, 1964; Ph.D., Washington State University, 1973. Associate Professor.  
Experience: Associate professor, California State University, Fullerton; Arizona State University; research and teaching assistant, Washington State University; instructor, University of California, Santa Barbara.
- BASOR, ESTELLE L. (1976)** ..... Mathematics  
B.A., University of California, Santa Cruz, 1969; Ph.D., 1975. Assistant Professor.  
Experience: Teaching fellow, University of California, Berkeley; instructor, Cabrillo College; teaching assistant, lecturer, University of California, Santa Cruz.
- BATTERSON, RONALD E. (1971)** ..... Architecture  
B.S., Arch., University of Cincinnati, 1964; M. Arch., University of Washington, 1970, graduate study, Danish Royal Academy of Arts; George C. Marshall fellowship grant. Associate Professor.  
Experience: Teaching assistant, University of Washington; designer for Reed Morgan, AIA, Seattle, Larry Blackman, AIA, Indiana, Sanborn, Steketee, Otis & Evans, AIA, Toledo, Ohio, Ole Helweg, MAA, Denmark, Carl Strauss, AIA, Cincinnati, Ohio; planner and coordinator, Inter-American Center, Miami; registered architect, Ohio.
- BAUMGARTEN, GEORGE M. (1969)** ..... Architecture  
B. Arch., University of Michigan, 1947; M. Arch., University of California, Berkeley, 1976. Associate Professor.  
Experience: Lecturer, Old Dominion University; private practice; project architect, John Graham & Co.; project coordinator, Victor Gruen Association; zoning analyst, Harrison, Ballard and Allen; designer, Skidmore, Owings and Merrill; registered architect, New York, Michigan.

- BAUR, LAWRENCE E., JR. (1965)** ..... Accounting  
B.B.A., University of Michigan, 1954; M.B.A., 1957. Associate Professor.  
Experience: Staff accountant, Wagar, Lunt and Oehring, Michigan; accountant, U.S. General Accounting Office, Los Angeles; staff accountant, Touche, Ross and Co.; U.S. Army; C.P.A.
- BAYNE, JAY S. (1973)** ..... Computer Science and Statistics  
B.S.E.E., University of California, Santa Barbara, 1969; M.S., E.E., 1971; Ph.D., 1977. Associate Professor.  
Experience: Engineer, Applied Magnetics, Santa Barbara; design engineer, Magnetics, Inc., Santa Monica; research associate, University of California, Santa Barbara; consultant, Federal Electric Corporation, Vandenberg AFB, Hewlett Packard, Inc., Colorado Springs, Service Bureau Corporation, Campbell.
- BEARDSLEY, GEORGE L., JR. (1975)** ..... Economics  
B.A., University of California, Berkeley, 1971; M.A., University of Pennsylvania, 1973; Ph.D., 1974. Assistant Professor.  
Experience: Teaching assistant, University of Pennsylvania; project administrator's aide, Westinghouse Electric Corporation, Baltimore; cost analyst, Kaiser Aluminum and Chemical Corporation, Maryland and California.
- BEATIE, GEORGE C. (1959)** ..... Music  
A.B., University of California, Santa Barbara, 1949; M.A., California Polytechnic State University, 1956; additional graduate study, University of California, Santa Barbara; Northwestern University. Professor.  
Experience: Music teacher, elementary and secondary schools; band director, class program scheduler, associate dean, Special Programs, California Polytechnic State University.
- BEAUVAIS, H. PAUL (1970)** ..... Senior Clinical Laboratory Technologist  
Hospital Corps School, Medical Dept., U.S. Navy, 1942; Glendale College, 1949-51.  
Experience: Chief laboratory technologist, Northridge Hospital, California; Facey Medical Group, Granada Hills.
- BECK, DENNIS L. (1976)** ..... Ornamental Horticulture  
B.S., University of California, Davis, 1975; M.S., 1976. Assistant Professor.  
Experience: Teaching assistant, University of California, Davis.
- BEDWELL, JACK E. (1974)** ..... Natural Resources Management  
B.S., California State College, Long Beach, 1969; M.S. 1973. Associate Professor.  
Experience: Police officer, Santa Barbara, Burbank; deputy sheriff, Santa Barbara County; fish and game warden, State of California; deputy, United States Game Warden; instructor, College of the Desert, Palm Desert; instructor in law enforcement, Palm Springs and Coachella Valley High Schools; technical consultant to network TV and radio; U.S. Army.
- BEECHER, LLOYD N. (1969)** ..... History  
B.A., California State College, Fullerton, 1965; M.A., 1966; Ph.D., University of Georgia, 1970. Associate Professor.  
Experience: graduate assistant, California State College, Fullerton; teaching assistant, University of Georgia.
- BEGG, IAN C. (1970)** ..... Engineering Technology  
B.S.M.E., Witwatersrand University, South Africa, 1941; B.S.E.E., 1946; M.S., University of California, Berkeley, 1970. Associate Professor.  
Experience: Senior project engineer, The Rucker Co., Oakland; plant and tool engineer, Gilro Machine & Stamping Co., Oakland; tool designer, Kearney & Trecker Corp., Milwaukee; production engineer, First Electric Corp., South Africa; test engineer, Electricity Supply Commission, Johannesburg. Registered professional engineer, California and South Africa.

- BEHMAN, SARA A. (1971)** ..... Management  
A.B., University of Pennsylvania, 1943; M.G.A., 1944; Ph.D., University of California, Berkeley, 1966. Professor.  
Experience: Labor market analyst, California Department of Employment; research technician, California Senate Interim Committee on State and Local Taxation; historical assistant, Chicago Quartermaster Depot; research assistant, Department of Internal Affairs, Commonwealth of Pennsylvania; director of research, Center for Labor Research and Education at the Institute of Industrial Relations, University of California, Berkeley; lecturer, assistant professor, San Jose State College; associate dean, School of Business and Social Sciences, California Polytechnic State University; deputy director, and Chief, Labor Statistics and Research, State Department of Industrial Relations.
- BENNETT, DARRELL F. (1971)** ..... Pharmacist  
B.S., University of Arizona, 1965.  
Experience: Registered pharmacist, retail pharmacies, San Luis Obispo County Hospital.
- BERMANN, JAMES (1964)** ..... Agricultural Engineering  
B.S., California State Polytechnic College, 1959, 1961; M.S., Michigan State University, 1971. Professor.  
Experience: Chief engineer, Grether Agricultural Co.; farming; U.S. Army.
- BERTOZZI, DAN, JR. (1974)** ..... Business Administration  
A.B., University of California, Berkeley, 1966; M.B.A., 1969; J.D., 1971. Associate Professor.  
Experience: General law practice in California; economist, U.S. Department of Labor, Washington, D.C.; research assistant, University of California, Berkeley.
- BETHEL, ARTHUR C. W. (1968)** ..... Philosophy  
B.A., University of California, Santa Barbara, 1964; M.A., 1968; Ph.D., 1974. Associate Professor.  
Experience: Associate instructor, University of California, Santa Barbara.
- BEUG, JAMES L. (1973)** ..... Computer Science and Statistics  
B.A., Northwestern University, 1962; M.S., Ohio State University, 1971; Ph.D., 1974. Associate Professor.  
Experience: Research assistant, University of Chicago; research, teaching assistant, University of Illinois; senior systems analyst, Abbott Laboratories, North Chicago; teaching assistant, research associate, Ohio State University; software engineer, Tektronix, Inc.
- BEYMER, CHARLES R. (1966)** ..... Library  
B.S., University of Wisconsin, 1950; M.L.S., 1955; additional graduate study, University of Wisconsin, University of California, Berkeley. Librarian.  
Experience: Cataloger, Marquette University, Cornell University, Finger Lakes Library System, Ithaca, New York; science reference librarian, University of Norte Dame.
- BIRKETT, RICHARD J. (1955)** ..... Animal Science  
B.S., California State Polytechnic College, 1953; M.S., Kansas State University, 1963. Professor.  
Experience: Feed and milling supervision, Union Stock Farms, Blythe; research assistant, Kansas State University.
- BJORKMAN, DONALD C. (1977)** ..... Art  
B.A., University of Washington, 1963; M.F.A., School for American Craftsmen, Rochester Institute of Technology, 1965. Associate Professor.  
Experience: Instructor, Rochester Institute of Technology; assistant professor, California College of Arts and Crafts; associate professor, University of Wisconsin-Stout.
- BLESSE, ROBERT E. (1977)** ..... Library  
B.A., California State University, Chico, 1970; M.A., 1972; M.L.S., University of California, Los Angeles, 1974. Assistant Librarian.  
Experience: Library representative, Holmes Book Company.

- BLODGET, ROBERT L. (1974)** ..... Child Development  
B.A., Willamette University, 1965; Ed.D., University of Massachusetts, 1973. Associate Professor.  
Experience: Junior high school teacher and counselor; chairman, junior high school social studies; choral director; research associate, Center for the Study of Human Potential, University of Massachusetts.
- BLOOD, MARTHA J. (1977)** ..... Building Operations Manager, University Union  
B.A., State University College of New York at Geneseo, 1971; M.S.Ed., State University College of New York at Brockport, 1973.  
Experience: Director of operations, University Union, State University of New York at Stony Brook.
- BOCHE, RAYMOND E. (1969)** ..... Industrial Engineering  
B.S., California State Polytechnic College, SLO, 1958; M.S., San Jose State College, 1966; Ph.D., Texas Tech University, 1971. Professor.  
Experience: Computing, mathematics and operations research, The Boeing Company, Seattle; Technical Operations, Inc., Monterey and Washington, D.C.; Laboratory for Electronics, Monterey; Lockheed Missiles and Space Co., Palo Alto and Sunnyvale; assistant director of the Computer Center and assistant professor, Texas Technological College.
- BONDS, ROBERT V. (1972)** ..... Coordinator, Disabled Student Services  
B.A., San Jose State College, 1965; M.S., University of California, Los Angeles, 1972; M.A., California Polytechnic State University, 1978; additional graduate study, University of California, Santa Barbara.  
Experience: Teacher-counselor, Rancho Linda School, San Jose; teacher-adviser-coach, North High School, Riverside; consultant for ethnic involvement in education, Santa Clara County, Riverside County, San Bernardino County, Los Angeles County; assistant aquatic director, University of California, Los Angeles; assistant to dean of students, University of California, Los Angeles.
- BOONE, JOSEPH C. (1968)** ..... Physics  
B.A., Earlham College, 1962; M.A., University of Wisconsin, 1967; Ph.D., 1970. Professor.  
Experience: Teaching and research assistant, University of Wisconsin.
- BOOTH, JAMES S. (1972)** ..... Biological Sciences  
B.S., Los Angeles State College, 1959; M.S., University of Southern California, 1962; Ph.D., 1968. Associate Professor.  
Experience: Research assistant, instructor, University of Southern California; instructor, California State College, Los Angeles; assistant professor, University of New Mexico.
- BOSTROM, ROBERT M. (1956)** ..... Director, Housing  
B.S., California State Polytechnic College, 1956; M.A., 1970.  
Experience: Graduate manager, California State Polytechnic College.
- BOWEN, JAMES J. (1972)** ..... Education  
B.A., Western Michigan University, 1962; M.A., 1965; Ed.D., University of California, Los Angeles, 1969. Associate Professor.  
Experience: Elementary school teacher, Imlay City, Michigan and Lompoc, California; assistant professor, California State University, Los Angeles.
- BOWKER, LESLIE S. (1974)** ..... Biological Sciences  
B.S., University of Massachusetts, 1963; M.S., Rutgers University, 1965; Ph.D., Washington State University, 1974. Associate Professor.  
Experience: Teaching assistant, Rutgers University; instructor, Christopher Newport Junior College; research technician, University of Delaware Marine Station; teaching assistant, Washington State University.
- BRADY, MARY L. (1968)** ..... Library  
B.A., Mundelein College, 1960; M.A.L.S., Rosary College, 1966; M.A., California Polytechnic State University, 1978. Associate Librarian.  
Experience: Editorial assistant, The National Catholic Monthly, Chicago; cataloger, Mundelein College.

- BRADY, ROBERTO GONZALES (1977)** .. Counselor, Educational Opportunity Program  
B.A., University of California, Santa Barbara, 1974; M.A., 1976.  
Experience: Probation, juvenile detention facilities, community liaison work for federally-funded programs, EOP and Upward Bound counseling positions, community college instructor.
- BRAUNINGER, ANDREA, M.D. (1974)** ..... Physician  
A.B., California State University, San Jose, 1966; M.D., University of Southern California, 1971; Medical Internship, University of Florida, 1972.  
Experience: Student health physician, University of Florida.
- BREAZEALE, CONNIE R. (1966)** ..... Home Economics  
B.A., California State Polytechnic College, 1960; M.A., 1966. Associate Professor.  
Experience: Chairman, Home Economics Department, Santa Maria High School; home economics coordinator, Peace Corps; Suji Culinary School, Osaka School for Professional Chefs, Osaka, Japan; Marcella Hazan, School of Classical Italian Cuisine, Bologna, Italy; Far Eastern Cuisine and Culture, Honolulu, Hawaii; James Beard, School of American Cuisine, San Francisco.
- BRENNAN, ANDREW (1968)** ..... Coach, Physical Education  
B.S., University of Southern California, 1958; M.S., 1960.  
Experience: Graduate assistant, University of Southern California; teacher/coach, Mira Loma High School, Glendale High School, Downey High School, Rio Hondo Junior College.
- BRENNER, PATRICIA A. (1970)** ..... English  
B.S., Bob Jones University, 1957; M.A., Middlebury College, 1963; Ph.D., Kent State University, 1970. Associate Professor.  
Experience: Teacher, Binghamton, N.Y., Winchester, Massachusetts, Beachwood, Ohio, Kent State University, Ohio.
- BRODIE, DAVID A. (1970)** ..... Architecture  
B. Arch., University of Capetown, S.Africa, 1953; M. Arch., University of California, Berkeley, 1964. Professor.  
Experience: Assistant planner, City of Oakland; professor, and teaching assistant, University of California, Berkeley; architect for various firms in England and Rhodesia.
- BROWN, HOWARD C. (1943)** ..... Dean, School of Agriculture and Natural Resources  
B.S., California State Polytechnic College, 1943; M.S., Ohio State University, 1954; Ph.D., 1963.  
Experience: U.S. Army Air Force; head, Ornamental Horticulture Department, California Polytechnic State University.
- BROWN, JOHANNA B. (1969-1973, 1974)** ..... Library  
B.A., Saint Mary's College, 1966; M.L.S., State University of New York at Geneseo, 1967. Senior Assistant Librarian.  
Experience: Reference librarian, University of Montana.
- BROWN, ROBERT J. (1969)** ..... Biological Sciences  
B.S., California State College, Los Angeles, 1964; M.S., Arizona State University, 1967; Ph.D., University of Toronto, Ontario, Canada, 1972. Associate Professor.  
Experience: Teaching assistant, California State College, Los Angeles; research assistant, Arizona State University; teaching assistant, University of Toronto.
- BROWN, RONALD F. (1974)** ..... Physics  
B.A., University of California, Riverside, 1962; M.A., 1964; Ph.D., 1968. Assistant Professor.  
Experience: Teaching assistant, research assistant, University of California, Riverside; physicist, Naval Electronics Laboratory and Naval Weapons Center; assistant professor, Harvey Mudd College.
- BROWN, RUSSELL H. (1978)** ..... Dean of Students  
B.A., Whitworth College, 1958; M.A., University of Nebraska, 1960; Ph.D., 1967.  
Experience: Dean for student development and associate professor, University of Nebraska; vice president for student affairs and associate professor, University of North Dakota, Grand Forks.

- BROWN, WILLIAM H. (1957)** ..... Architecture  
 B. Arch., University of Florida, 1954; M. Arch., 1968; additional graduate study, University of Sydney. Professor.  
 Experience: Draftsman, Trend Associates, L. C. Kingscott and Associates, Viking Products Company, Valley Metal Products Company; instructor, University of Florida; architectural designer, John E. Piercy, D. Stewart Kerr; private practice. Registered architect, California.
- BRUCKART, WILLIAM L. (1969)** ..... Industrial Technology  
 B.S., University of Kentucky, 1942; M.S., Ohio State University, 1953; additional graduate study, Bowdoin College and Massachusetts Institute of Technology. Associate Professor.  
 Experience: Officer, U.S. Navy; engineer, Southern Liquid Gas Co., Dothan, Alabama; assistant chief; non-ferrous physical metallurgy group, Battelle Memorial Institute, Columbus, Ohio; sales manager, Cyclops Corporation, Bridgeville, Pennsylvania; consultant, Pittsburgh; manager, metallics and refractories, Aerojet-General Corporation; consultant, Torrance; chief engineer, Fansteel, Inc., Advanced Structures Division.
- BRUG, RICHARD C. (1978)** ..... Director, Public Safety  
 A.A., Compton College, 1969; B.A., California State University, Long Beach, 1974.  
 Experience: Investigator, Long Beach Police Department; lieutenant, Bell Gardens Police Department; director of public safety, California State University, Los Angeles
- BRUNK, ATHOL J. D. (1957)** ..... Physics  
 B.S., Northwestern State Teachers College, 1937; M.A., West Texas State Teachers College, 1941. Associate Professor.  
 Experience: Instructor in mathematics and science, high school, Beaver, Oklahoma; elementary principal, Alamogordo, New Mexico; officer, U.S. Navy; mathematics instructor, Atascadero.
- BUCCOLA, VICTOR A. (1962)** ..... Director of Athletics  
 B.S., California State Polytechnic College, 1956; M.A., 1957; Ed.D., Arizona State University, 1972. Professor.  
 Experience: Officer, U.S. Army; physical education instructor and athletic coach, College of Idaho; science and math instructor and athletic coach, Mark Keppel High School.
- BUCICH, RICHARD A. (1963)** ..... Electronic and Electrical Engineering  
 B.S.E.E., Illinois Institute of Technology, 1954; M.S.E.E., 1956. Assistant Professor.  
 Experience: Sub-station operator, electrical engineer, U.S. Steel Corporation; graduate assistant, Illinois Institute of Technology; assistant professor, Purdue University Center.
- BUFFA, ANTHONY J. (1970)** ..... Physics  
 B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Illinois, 1966; Ph.D., 1969. Associate Professor.  
 Experience: Teaching aide, Rensselaer Polytechnic Institute; teaching assistant, research assistant, University of Illinois; lecturer, California State Polytechnic College, San Luis Obispo.
- BURNS, CHARLOTTE B. (1974)** ..... Ornamental Horticulture  
 B.A., University of California, Los Angeles, 1951; graduate studies, University of Hawaii; University of California, Berkeley; University of California, Irvine. Associate Professor.  
 Experience: Manager, Hollister's Nursery and Florist, Newport Beach; associate ombudsman, University of California, Irvine; theater manager, University of Hawaii.
- BURRELL, SHEL A. (1973)** ..... Acting Associate Director, Placement  
 B.A., University of California, San Diego, 1971.  
 Experience: Contract reviewer, sales reviewer, Prudential Insurance Company, Los Angeles; placement interviewer, California Polytechnic State University.
- BURROUGHS, SARAH E. (1967)** ..... Home Economics  
 B.S. and Certificate in Medical Technology, University of Michigan, 1956; Ph.D., University of California, 1967. Professor.  
 Experience: Senior technician, University Hospital, Ann Arbor; biochemist, Akron General Hospital; supervising chemist, Parma Community Hospital, Ohio; biochemist, Stanford Research Institute; research/teaching assistant, University of California, Berkeley.

- BURT, CHARLES M. (1978)** ..... Agricultural Engineering  
B.S., California Polytechnic State University, 1973; M.S., Utah State University, 1975. Associate Professor.  
Experience: Irrigation systems designer, Wren-Oneal Co., Keller Engineering; U.S. Army. Registered professional engineer, California.
- BURT, WALLACE H. (1968)** ..... Accounting  
B.S., University of California, 1949; M.B.A., University of Denver, 1962; M.P.A., University of Southern California, 1975. Associate Professor.  
Experience: Teacher, Shasta Union High School; assistant county superintendent of schools, Shasta County; certified public accountant, staff, Muncy and Company, C.P.A.'s; instructor, Coalinga College; consultant, State of California; C.P.A.
- BURTON, ROBERT E. (1968)** ..... Head, History Department  
A.B., San Diego State College, 1962; M.A., University of Oregon, 1964; Ph.D., 1969. Professor.  
Experience: Teaching assistant and assistant professor, University of Oregon; instructor, Glendale College.
- BUSCHMAN, WILLIAM O. (1956)** ..... Computer Science and Statistics  
A.B., Reed College, 1941; M.Ed., University of Oregon, 1947; Ed.D., Oregon State University, 1953. Professor.  
Experience: Marine engineering and naval architecture, Kaiser Co., and others; teacher, Portland Public Schools, Gresham Union High School; instructor, Multnomah College, Oregon State University; assistant professor, Oregon State System of Higher Education; assistant professor, Portland State College; research, University of Oregon Medical School, Stanford Research Institute, and Institute for Motivational Research.
- BUSSELEN, HARRY J., JR. (1975)** ..... Head, Home Economics Department  
B.S., California State College, Sacramento, 1959; M.S., 1962; Ph.D., Florida State University, 1970; additional graduate study, University of Oregon. Professor.  
Experience: Administrative aide, United States Air Force; instructor, Lodi Union High School; instructor, San Joaquin Delta College; assistant professor, Southern Oregon College; professor, Central Michigan University.
- BUTLER, J. KENT (1977)** ..... Industrial Engineering  
B.S.E., Arizona State University, 1961; M.S.E., 1963; Ph.D., 1971. Associate Professor.  
Experience: Systems analyst, Motorola Semiconductor, DVR; sales engineer, Cutler-Hammer, Inc.; reliability engineer, North American Aviation.
- BUXBAUM, JAMES M. (1978)** ..... Business Administration  
B.A., Harvard College, 1949; J.D., Columbia University Law School, 1955; M.A., Claremont Graduate School, 1976, Ph.D., 1978; additional studies, University of Paris, Hague Academy of International Law. Associate Professor.  
Experience: Lecturer and senior tutor, Claremont Men's College; private law practice, Los Angeles; general manager, American Film Institute Center for Advanced Film Studies, Beverly Hills; executive vice-president, Ivan Tors films, Hollywood and Miami; producer, NBC TV series "Flipper"; associate producer, "Seahunt" TV Series; executive in charge of production, ABC feature film; attorney, William Morris Agency, Inc., Beverly Hills; merchant builder, Long Island and Houston.
- CAIRNS, EDWARD A. (1969)** ..... English  
B.A., Stanford University, 1956; M.A., San Francisco State University, 1963; Ph.D., University of Denver, 1971. Associate Professor.  
Experience: Instructor, University of Denver; assistant professor, Yankton College; instructor and supervisor of instructors, Cryptographic School, USAF.



- CALL, TRACEY G. (1962)** ..... Biological Sciences  
B.S., Idaho State College, 1940; M.S., University of Maryland, 1944; A.B., Brigham Young University, 1947; Ph.D., University of Minnesota, 1956. Professor.  
Experience: Teaching assistant, Idaho State College, University of Washington, University of Maryland; drug store manager, Afton, Wyoming; assistant professor, Duquesne University, University of Wyoming; associate professor, Montana State University; research pharmacologist, Sunkist Growers, Inc.; project director-consultant, W.L.R.I., Holland-Rantos Youngs Rubber Corporation.
- CANO, RAUL J. (1974)** ..... Biological Sciences  
A.A., Spokane Community College, 1968; B.S., Eastern Washington State College, 1970; M.S., 1972; Ph.D., University of Montana, 1974. Associate Professor.  
Experience: Teaching assistant, research assistant, Eastern Washington State College; teaching assistant, University of Montana; research fellow, University of Montana.
- CARLEY, CHRISTOPHER P. (1976)** ..... Ornamental Horticulture  
B.S., University of Texas, 1974; M.S., Texas A & M University, 1975; additional graduate study, North Carolina State University. Assistant Professor.  
Experience: Graduate assistant, Texas A & M University; assistant propagator, Greenleaf Nursery; teaching and research assistant, North Carolina State University.
- CARNEGIE, E. J. (1963-64) (1965)** ..... Agricultural Engineering  
B.S., California State Polytechnic College, 1962; M.Eng., University of California, Davis, 1963. Professor.  
Experience: Research assistant, University of California, Davis; junior agricultural engineer, University of California; officer, U.S. Naval Reserve. Registered professional engineer, California.
- CARPENTER, THOMAS W. (1968)** ..... Aeronautical Engineering  
B.S., Virginia Polytechnic Institute, 1961; M.S., 1964; Ph.D., Purdue University, 1969. Professor.  
Experience: Research assistant, instructor, Purdue University; engineer, Hamilton Standard.
- CARR, LAURENCE H. (1963)** ..... Engineering Technology  
B.S., University of Chicago, 1932; M.S., 1934. Professor.  
Experience: Director of research and engineering, Edward Valves, Inc.; lecturer and assistant professor, Purdue University; mechanical engineer, Pacific Gas & Electric Co. Registered professional engineer, California.
- CARY, ARTHUR S. (1974)** ..... Physics  
B.A., Fisk University, 1949; M.A., 1951; Ph.D., University of California, Riverside, 1969. Associate Professor.  
Experience: Instructor, Dillard University; associate professor, Tennessee State University; research assistant, University of California, Riverside; associate professor, Harvey Mudd College.
- CASTILLO, SYLVIA E. (1976)** ..... Counselor  
B.A., University of California, Santa Barbara, 1973; M.S.W., University of California, Berkeley, 1976.  
Experience: Clinical caseworker, El Centro Salud Mental; caseworker for developmentally disabled, California State Department of Health; secondary consultant, Oakland Unified School District.
- CENSULLO, ALBERT C. (1974)** ..... Chemistry  
B.S., Villanova University, Pennsylvania; Ph.D., Penn State University, 1975. Assistant Professor.

- CHAPMAN, ARTHUR J. (1972)** ..... Architecture  
B.S., B. Arch., California State Polytechnic College, 1970; M.S., Pennsylvania State University, 1971; additional graduate study, University of California, Los Angeles. Associate Professor.  
Experience: Systems analyst, LOG/AN, Los Angeles; production scheduler Praeger, Kavanagh, Waterbury, New York; National Science Foundation teaching assistant, Department of Computer Science, Pennsylvania State University; architectural draftsman, Spencer, Lee & Busse, Palo Alto.
- CHEEK, DONALD K. (1973)** ..... Education  
B.S., Seton Hall University, 1953; M.S.W., Fordham School of Social Service, 1955; Ph.D., Temple University, 1971.  
Experience: Probation officer, Los Angeles County Probation Department; senior psychiatric social worker, Atascadero State Hospital; consultant, York School System, PA; director, Upward Bound Program, Swarthmore College; vice president, student affairs, dean of students, lecturer, Lincoln University; vice-president, Director of Black Studies Center, lecturer, Claremont Colleges/Human Resources Institute; counselor, California State University, San Luis Obispo.
- CHESTNUT, F. STUART (1963)** ..... Physical Education  
B.S., Indiana University, 1951; M.S., 1963; additional graduate study Indiana University, University of Oregon. Professor.  
Experience: Technical supervisor, Commercial Solvents Corp.; coach-teacher, senior high school, Terre Haute, Washington, and Brazil, Indiana; teaching assistant, University of Oregon.
- CHEW, MARIE (1976)** ..... Graduate Nurse  
R.N., St. Joseph College, Emmitsburg, Maryland; 1959; B.S., 1959.  
Experience: Medical staff nurse, Veterans Administration Hospital, Syracuse, N.Y.; Ob-Gyn, St. Mary's Hospital, Tucson; evening supervisor, Tucson General Hospital; industrial nurse, Lockheed Missiles and Space Company, Sunnyvale; relief industrial nurse, Ampex Corporation, Redwood City, Syntex, Palo Alto.
- CHIPPING, DAVID H. (1971)** ..... Physics  
B.S., Cambridge University, England, 1965; M.S., Stanford University, 1967; Ph.D., 1970. Associate Professor.  
Experience: Chief field assistant Geological Survey of Canada; teaching assistant, lecturer, Stanford University; assistant professor, University of California, Davis.
- CHIZEK, GAYLORD J. (1958)** ..... Agricultural Management  
B.S., Kansas State College, 1957; M.S., 1958; additional graduate study, Oregon State University. Professor.  
Experience: Assistant instructor, Kansas State College, Manhattan; farmer; U.S. Army.
- CHOU, THOMAS T. L. (1961)** ..... Electronic and Electrical Engineering  
B.S.E.E., Chinese National Chekiang University, 1947; M.S.E.E., University of Washington, 1956; additional graduate study, University of California, Los Angeles. Professor.  
Experience: Research fellow, NASA Ames Research Center, Moffett Field; senior research engineer, member technical staff, Autonetics, Division of North American Rockwell Corporation, Anaheim; associate professor, National Chiao-tung University, Taiwan; senior engineer, Sverdrup-Parcel, Inc., San Francisco; research assistant, University of Washington.
- CHRISTENSON, ROBERT A. (1970)** ..... Child Development  
B.S., University of Utah, 1963; M.S., Brigham Young University, 1968; Ph.D., 1970. Associate Professor.  
Experience: Teaching assistant, part-time instructor, Brigham Young University.
- CIANO, DAVID A. (1973)** ..... Director of Judicial Affairs  
B.A., University of Redlands, 1966; J.D., University of California, Los Angeles, 1972.  
Experience: Legal research assistant, San Bernardino County District Attorney's Office; teacher, San Bernardino City Schools; officer, U.S. Army.

- CICHOWSKI, ROBERT S. (1971)** ..... Chemistry  
B.S., Purdue University, 1964; Ph.D., Alfred University, 1968. Associate Professor.  
Experience: Research chemist, Phillips Petroleum Company.
- CIRONE, JOAN M. (1971)** ..... Nurse Practitioner  
R.N., Cuesta College, 1971; Nurse Practitioner, University of California, Los Angeles, 1974; B.S.N., California State College, Bakersfield, 1979.
- CIROVIC, MICHAEL M. (1968)** ..... Electronic and Electrical Engineering  
B.E., New York University, 1965; M.S., 1968. Professor.  
Experience: Assistant professor, Academy of Aeronautics; engineer, General Cable Corporation.
- CLARK, WILLIAM E. (1977)** ..... Environmental Engineering  
B.M.E., University of Minnesota, 1964; M.S., 1966; Ph.D., 1972. Associate Professor.  
Experience: Research fellow, and associate, University of Minnesota; research engineer, Battelle Memorial Institute; member technical staff, Science Center and Air Monitoring Center, Rockwell International.
- CLAUSE, ODILE M. (1976)** ..... Foreign Languages  
B.A., University of Wyoming, 1967; M.A., 1968; Ph.D., University of Colorado, 1975. Assistant Professor.  
Experience: Instructor, University of Wyoming; teacher, Powell High School, Wyoming; teacher associate, University of Colorado.
- CLEATH, ROBERT L. (1968)** ..... Speech Communication  
B.A., Northwestern College, 1950; M.A., University of Oregon, 1951; Ph.D., University of Washington, 1963; M.Div., San Francisco Theological Seminary, 1965. Professor.  
Experience: Assistant professor, Westmount College, Whitworth College, University of California, Santa Barbara; teaching assistant, University of Washington; instructor, California State Polytechnic College; assistant editor, *Christianity Today*, Washington, D.C.
- CLERKIN, EDWARD J. (1964)** ..... Electronic and Electrical Engineering  
B.S.E.E., Colorado State University, 1950; M.S.E.E., University of Idaho, 1962; additional graduate study, Utah State University, Colorado State University, Oklahoma University. Associate Professor.  
Experience: Instructor, University of Idaho and Chico State College; graduate assistant, Oklahoma University; technical associate, Argonne National Laboratory; engineer, Diversified Builders, General Electric Company, Rohr Aircraft Corp. Registered professional engineer, California.
- CLOGSTON, FRED L. (1960)** ..... Biological Sciences  
B.A., B.S., Western Washington College, 1950; M.S., University of Washington, 1956; Ph.D., 1965. Professor.  
Experience: Instructor, public schools; teaching and research assistant, University of Washington; research associate, Office of Naval Research; instructor, Western Washington College; associate, University of California, Santa Barbara.
- CLOONAN, CLIFFORD B. (1957)** ..... Electronic and Electrical Engineering  
B.S., University of Colorado, 1955; M.S.E.E., Montana State University, 1961; Ph.D., University of Colorado, 1975. Professor.  
Experience: Instructor, U.S. Army Signal Corps; physical science aide and electronic scientist, National Bureau of Standards, Boulder; systems design engineer, Collins Radio Company, Cedar Rapids; research associate and research assistant, Electronic Research Laboratory, Montana State University; consultant, McDonnell Aircraft Company, St. Louis; microwave engineer, Hewlett-Packard Company, Palo Alto; National Science Foundation faculty fellow, University of Colorado.

- CLUCAS, GEORGE G. (1956-62) (1968)** ..... Political Science  
 A.B., University of Michigan, 1947; M.P.A., 1949; Ph.D., University of Southern California, 1969. Professor.  
 Experience: Senior budget analyst, Office of Legislative Analyst, Sacramento; dean, Finance and Development, California State Polytechnic College; chief, Budget Planning and Operations, Chancellor's Office, The California State Colleges, Los Angeles; director, research and development and interim dean, School of Business and Social Sciences, California State Polytechnic College.
- COATS, DONALD M. (1964)** ..... Associate Dean, Educational Services  
 B.S., California State Polytechnic College, 1964; M.A., 1969.  
 Experience: Branch manager, Southern Pacific Milling Co., San Luis Obispo; sales representative and materials engineer, Walter B. Roselip Co., Atascadero; quality control inspector, Lindero Investment Co., San Luis Obispo; U.S. Navy; admissions officer, California State Polytechnic College.
- COCHRAN, BURT JR. (1976)** ..... Medical Officer  
 M.D., University of Southern California Medical School, 1949.  
 Experience: Internship, residency, Los Angeles County Hospital; associate clinical professor, Loma Linda School of Medicine; staff internist, Los Angeles County Medical Center; assistant professor, University of California College of Medicine; associate clinical professor, Los Angeles County-University of Southern California Medical Center; U.S. Air Force, Fairbanks; Certified American Board of Internal Medicine; Fellow, American College of Physicians.
- COCHRANE, MONA (1970)** ..... Nurse Practitioner  
 R.N., Knapp College of Nursing, Santa Barbara, 1953.  
 Experience: Clinic nursing, Orthopedic and Internal Medicine Specialty, San Luis Medical Clinic; ENT specialty nurse, Phoenix; office assistant general surgery, Santa Barbara; industrial nursing, Miami Inspiration Copper Co., Miami, Arizona; general staff nurse, San Luis Obispo General Hospital.
- COE, ROBERT K. (1978)** ..... Dean, School of Business  
 B.S., 1957; M.B.A., 1958; Ph.D., Syracuse University, 1963; B.A., California State College, Bakersfield, 1977.  
 Experience: Instructor, Syracuse University; assistant professor, California State University, Sacramento; associate professor and chair, Management Department, University of Nevada, Reno; professor and chair, Department of Business Administration, Virginia Polytechnic Institute and State University; dean and professor of Management, School of Business and Public Administration, Academic Village Provost, California State College, Bakersfield; Fulbright Fellow, Uruguay; visiting professor, University of the Americas, Mexico.
- COLEMAN, EUGENE F. (1972)** ..... Graphic Communications  
 B.S., University of Pittsburgh, 1934; graduate study, University of Pittsburgh, Washington University. Associate Professor.  
 Experience: Physicist, National Bureau of Standards; technical staff member, RCA Laboratories; chief engineer, Hillyer Instrument Corp.; associate research staff, Engineering Experiment Station, Rutgers University; market research manager, Mergenthaler Linotype Co.; lecturer, industrial management, Polytechnic Institute of Brooklyn; research staff member, MGD Graphic Systems.
- COLEMAN, JAMES W. (1973)** ..... Social Sciences  
 B.A., California State University, Northridge, 1969; M.A., University of California, Santa Barbara, 1971; Ph.D., 1975. Associate Professor.  
 Experience: Lecturer, Chapman College Vandenberg AFB; instructor, Ventura College; graduate assistant, University of California, Santa Barbara.
- COLLINS, THOMAS A. (1973)** ..... Medical Officer  
 B.S., Stanford University, 1935; M.D., Stanford University School of Medicine, 1940; residency, surgery, Highland-Alameda County Hospital, 1941; M.P.H., Harvard School of Public Health, 1955; Diplomate, American Board of Preventive Medicine, 1956.  
 Experience: Industrial medicine; private practice; public health physician, Monterey County; emergency room physician, Santa Cruz General Hospital; U.S. Air Force.

- COLOME, JAIME S. (1972) ..... Biological Sciences  
B.A., University of California, Santa Barbara, 1966; M.A., 1973; Ph.D., 1974. Associate Professor.  
Experience: Teaching and research assistant, pre-doctoral fellow, University of California, Santa Barbara.
- COMPTON, LUVENIA (1969) ..... Library  
A.B., University of Kentucky, 1962; M.S.L.S., 1965; additional graduate study, Allan Hancock College, Temple Buell College. Senior Assistant Librarian.  
Experience: Teacher, Floyd County Board of Education; claims adjuster, Social Security Administration; interviewer and office manager, U.S. Employment Service; teacher, Summit Elementary School; librarian, Norwalk High School and Lompoc Unified School District; district librarian, Rim-of-the-World Unified School District.
- CONNELY, JOHN B. (1970) ..... Coordinator, Liberal Studies  
and International Programs; Education  
B.A., University of Southern California, 1958; Ph.D., 1970. Professor.  
Experience: Foreign Service Officer, vice-consul, U.S. Department of State, Munich, Germany; lecturer, California State College, Los Angeles and California State Polytechnic College, Pomona; teacher and chairman of Social Studies Department, Gage Junior High School, Huntington Park; associate dean, School of Human Development and Education, California Polytechnic State University; associate professor, University of Southern California.
- CONNER, E. WESLEY (1963) ..... Ornamental Horticulture  
B.S., California State Polytechnic College, 1956; M.Phil. (L. Arch), University of Nottingham, England, 1974. Professor.  
Manager, Landscape Department, Yosemite Park & Curry Company; landscape consultant, Spencer & Lee, Architects, San Diego and Napa County; assistant to landscape architect, Huettig & Schromm, Palo Alto. Registered landscape architect, California.
- CONWAY, JAMES R. (1969) ..... Speech Communication  
B.A., California State College, Los Angeles, 1966; M.A., 1968; Ph.D., University of Southern California, 1977. Associate Professor.  
Experience: Instructor, San Fernando Valley State College; California State University, Los Angeles; California State College, Dominguez Hills.
- COOK, BARBARA E. (1972) ..... Social Sciences  
A.B., Duke University, 1965; M.A., Stanford University, 1967; Ph.D., 1974. Associate Professor.  
Experience: Field work, Fiji Islands; predoctoral and research fellow, National Institute of Mental Health; lecturer, Mills College.
- COOMBS, LEE CHARLES (1969) ..... Chemistry  
B.A., San Diego State College, 1963; M.S., 1965; Ph.D., Purdue University, 1970. Associate Professor.  
Experience: Teaching assistant and spectroscopist, San Diego State College; instructor, Purdue University.
- COOPER, ALAN F. (1970) ..... Biological Sciences  
B.S., California State Polytechnic College, Pomona, 1964; Ph.D., University of California, Riverside, 1969. Associate Professor.  
Experience: NDEA Fellowship, research assistant, postgraduate research nematologist, University of California, Riverside.
- COOPER, ALLAN R. (1975) ..... Architecture  
B.A. Arch., Rice University, 1967; B. Arch., Rice University, 1968; M. Arch., Cornell University, 1971.  
Experience: Project planner, Bechtel Power Corporation; Planning associate, Dan Saxon Palmer, AIA and Associates, Westwood; consultant, Gouvis Engineering, Long Beach; senior designer and consultant, Community Technology Corporation, Redondo Beach; assistant conceptual designer and project planner, Charles Gathers and Associates, Denver; designer-draftsman, Marvin Hatami and Associates, Denver; project planner, Egner and Niederkorn, Ithaca, New York. Associate Member, AIA.

- COOPER, TERENCE H. (1975)** ..... Soil Science  
 B.S., Michigan State University, 1969; M.S., 1970; Ph.D., 1975. Assistant Professor.  
 Experience: Field and laboratory technician, graduate research assistant and teaching assistant, Department of Crop and Soil Science, Michigan State University; soil scientist, Soil Survey Operation, Michigan Agricultural Experiment Station and U.S. Forest Service, Los Padres National Forest.
- COREY, LOUANNA M. (1975)** ..... Supervising Nurse  
 R.N., St. Mary's Hospital School of Nursing, Waterbury, Connecticut, 1942; B.S., California State University, Los Angeles, 1965; M.S., 1975; post graduate education as Pediatric Nurse Practitioner, Los Angeles County Health Department, 1967-68; Pediatric Nurse Practitioner certification by American Academy of Pediatrics, 1977.  
 Experience: Office nurse, general practitioner's office; staff nursing and night nurse supervisor, University of Southern California Medical Center; night supervisor, Garfield Cottage Hospital, Pomona; public health nursing, Los Angeles County Health Department; school nurse, Bassett Unified School District, La Puente.
- COTA, HAROLD M. (1965)** ..... Environmental Engineering  
 B.S., University of California, 1959; M.S., Northwestern University, 1960; Ph.D., Oklahoma University, 1966. Professor.  
 Experience: Engineer, Westvaco (FMC); research engineer, Lockheed Missiles and Space; graduate assistant, University of Oklahoma; consultant, noise control and air quality assessments; director, EPA Air Pollution Training Grant; member, Central Coast Regional Water Quality Control Board. Registered professional engineer, California.
- COYES, FRANK G. (1965)** ..... Agricultural Engineering  
 B.S., California State Polytechnic College, 1950; M.A., 1957. Professor.  
 Experience: Instructor, Coalinga Union High School, Coalinga College; licensed building contractor.
- CRABB, A. CHARLES (1978)** ..... Crop Science  
 B.S., University of California, Davis, 1973; M.S., Bowling Green State University, 1974. Assistant Professor.  
 Experience: Research assistant, Bowling Green State University; staff research associate, University of California, Davis; technical services director agricultural pest management firm.
- CRANE, FRANKLIN S. (1958)** ..... Engineering Technology and Mechanical Engineering  
 Petroleum engineer, Colorado School of Mines, 1943; graduate study, Massachusetts Institute of Technology. Assistant Professor.  
 Experience: Division engineer, Oil Well Supply Company; chief engineer, Martin-Decker Corporation; secretary-treasurer and director, Decker Engineering Corporation; officer, U.S. Navy; registered petroleum engineer, California.
- CRIVELLO, JOHN H. (1971)** ..... Coach, Physical Education  
 B.S. California State University, San Jose, 1969; M.S., California Polytechnic State University, 1970.  
 Experience: Graduate assistant, California Polytechnic State University.
- CRUIKSHANKS, RANDAL L. (1972)** ..... Political Science  
 B.A., University of California, Berkeley, 1963; M.A., University of Oregon, 1965; Ph.D., 1968; additional graduate study, University of Michigan. Associate Professor.  
 Experience: Research assistant, University of Oregon; consultant, Oregon Research Institute; instructor, University of Oregon; Captain, U.S. Army; assistant professor, University of New Mexico.
- CULVER, JOHN H. (1975)** ..... Political Science  
 B.S., University of Oregon, 1968; M.S., 1970; Ph.D., University of New Mexico, 1975. Associate Professor.  
 Experience: Teaching assistant, University of New Mexico; instructor, Southwest Missouri State University.

- CUMMINS, CARL C. (1958)** ..... Dean, School of Human Development and Education  
B.A., University of California, Santa Barbara, 1948; M.S., University of Southern California, 1952; Ed.D., University of California, 1957.  
Experience: Construction supervisor, National Shipbuilding Corporation, San Diego; plant engineer, Ryan Aeronautical Co.; professor, San Diego State College; engineer, General Electric Company.
- CURTIS, WILLIAM D. (1961)** ..... Psychology  
B.A., University of Redlands, 1948; M.A., University of California, Los Angeles, 1951; Ph.D., University of Denver, 1960. Professor.  
Experience: Probation officer, Riverside County; school psychologist, San Bernardino City Schools; professor, San Bernardino Valley College; psychologist, VISTA; visiting professor, Portland State College, University of Redlands, University of Denver, University of Hartford; I.B.M.
- CURZON, GORDON (1970)** ..... English  
B.S., DePaul University, 1941; B.A., St. Mary's College, 1945; M.A., Western Washington State University, 1966; Ph.D., University of California, Riverside, 1969. Associate Professor.  
Experience: Research chemist, industrial editor, Georgia-Pacific Corporation; teaching assistant, University of California, Riverside; instructor, College of the Desert.
- CUTLER, JOHN P. (1971)** ..... Architecture  
B.Arch, Massachusetts Institute of Technology, 1941; M.Arch, 1943. Associate Professor.  
Experience: Designer, Raymond Loewy Associates, New York; chief draftsman and designer, Clarence Mayhew, San Francisco; designer and job captain, John Lyon Reid & Partners, San Francisco; guest professor in Architecture, Bengal Engineering College; project architect, Reid, Rockwell, Banwell & Tarics, San Francisco; project architect, Rockwell & Banwell, Architects, San Francisco; associate, Reid & Tarics, Inc., San Francisco. Registered architect, California.
- D'ALBRO, JAMES A. (1969)** ..... Ornamental Horticulture  
B.S., Cornell University, 1966; M.S., University of California, Davis, 1969; additional graduate study, Michigan State University. Associate Professor.  
Experience: Part-time county agricultural agent; commercial greenhouse worker; research assistant, University of California, Davis; general production manager, commercial cut flowers, Goro Kawai, Inc., Salinas.
- DALY, JAMES C. (1972)** ..... Computer Science and Statistics  
B.S., Gonzaga University, 1966; Ph.D., Oregon State University, 1973. Associate Professor.  
Experience: Instructor, teacher and research assistant, Oregon State University.
- DAMANN, ALAN S. (1975)** ..... Agricultural Education  
B.S., California Polytechnic State University, San Luis Obispo, 1968; M.S., 1974. Assistant Professor.  
Experience: Director of vocational agriculture, Hemet High School.
- DARNIELLE, MAX E. (1967)** ..... English  
B.S., University of Oregon, 1950; M.S., Indiana University, 1967; additional graduate study, Indiana University. Assistant Professor.  
Experience: Teacher, South San Francisco, Oakland, Cincinnati, Columbus; teaching assistant, university fellow, Indiana University.
- DATTA, SAMIR KUMAR (1968)** ..... Electronic and Electrical Engineering  
B.E.E., Jadavpur University, Calcutta, India, 1958; M.S., University of Manchester, England, 1963; Ph.D., 1966. Professor.  
Experience: Graduate trainee, Askania-Werke, West Berlin, Germany; engineer Valvo GMBH, Hamburg, W. Germany; demonstrator, University of Manchester, England; application engineer, General Electric Company, New York; systems engineer, General Electric Company, Pennsylvania.
- DAUFFENBACH, MARILYN (1978)** ..... Registered Nurse  
R.N., De Anza College, 1973.  
Experience: Registered nurse, Palo Alto Medical Clinic, Cowell Health Center, Stanford University.

- DAVIDMAN, LEONARD (1977)** ..... Education  
B.A., Brooklyn College, 1966; M.A., Brooklyn College, 1972; Ph.D., Stanford University, 1976. Assistant Professor.  
Experience: Congress of Racial Equality field worker, South Carolina; elementary school teacher, New York City; assistant professor, San Jose State University, Whitman College, and California Polytechnic State University.
- DAVIDSON, OTTO C. (1968)** ..... Mechanical Engineering  
B.S., Bucknell University, 1955; M.S., Massachusetts Institute of Technology, 1956; Ph.D., Stanford University, 1960. Professor.  
Experience: Assistant professor, University of Utah, Robert College; officer, U.S. Army; engineer, various engineering firms in New York, Utah, California.
- DAVIDSON, S. SUE (1975)** ..... Counselor  
B.A., University of Iowa, 1957; M.A., University of Minnesota, 1965; Ph.D., 1975.  
Experience: Instructor, University of Minnesota; director, student activities and instructor, Lakewood Community College, Minnesota; instructor, Anuka-Ramsey Community College, Minnesota; program consultant, West Bank Union, University of Minnesota; music instructor, Dubuque and Anamosa, Iowa.
- DAVIS, CHARLES P. (1958)** ..... Civil Engineering  
B.S., Rensselaer Polytechnic Institute, 1948. Professor.  
Experience: Instructor and assistant professor, Rensselaer Polytechnic Institute; development engineering and product engineer leader, General Electric Company.
- DAVIS, M. LeROY (1976)** ..... Agricultural Management  
B.S., California State Polytechnic College, 1966; M.S., Iowa State University, 1968; Ph.D., Colorado State University, 1973. Assistant Professor.  
Experience: Instructor, Iowa State University; instructor, California State Polytechnic College; research assistant, Colorado State University; extension marketing economist, University of Georgia; associate professor and head of Department of Economics and Finance, Hardin-Simmons University.
- DAVIS, MARJORIE A. (1976)** ..... Clinical Laboratory Technologist  
A.A., Santa Rosa College, California 1954; B.S., University of Oklahoma, Norman, 1956; M.T., A.S.C.P., P.H. Microbiologist.  
Experience: Clinical laboratory technologist, Norwalk Hospital and Camarillo State Hospital, private physician's office, Ventura; chief technologist, private physician's office, Santa Maria; chief technologist/department head, Marian Hospital, Santa Maria; department head, Santa Maria Hospital.
- DEAN, ARNOLD M. (1949)** ..... Soil Science  
B.S., University of Alberta, Canada, 1943; M.S., 1946; Ph.D., University of Wisconsin, 1949. Professor.  
Experience: Laboratory assistant, Dominion Department of Agriculture, Edmonton, Alberta; teaching assistant; industrial fellowship, University of Wisconsin.
- DEARING, JAMES C. (1979)** ..... Music  
B.Music, University of Wisconsin, 1972; M.Music, 1973. Assistant Professor.  
Experience: Assistant professor and director of choral activities, University of Illinois, University of Virginia; graduate teaching assistant and assistant choral conductor, University of Wisconsin; assistant conductor, U.S. Army Soldiers Chorus.
- DEASE, CLYDE G. (1970-73) (1975)** ..... Physics  
B.S., Purdue University, 1961; M.S., University of Michigan, 1962; Ph.D., George Washington University, 1969. Associate Professor.  
Experience: Instructor, U.S. Army, Redstone Arsenal; research assistant, University of Michigan Office of Research Administration; physicist, Melpar, Inc., Falls Church, Virginia; instructor, George Washington University; physicist, Kaman Sciences Corporation, Tucson; lecturer, California Polytechnic State University.



- DECKER, CHARLES E. (1978)** ..... Graphic Communications  
B.S., Rochester Institute of Technology, 1962. Assistant Professor.  
Experience: President, Moore Printing Company, New York; publisher and president, Charles E. Decker Publishing Company, New York; president, Pyroglass Advertising, New York; assistant lithographic division chief, Western Publishing, Wisconsin; assistant plant manager, W. A. Krueger Lithographing, Wisconsin.
- DeJONG, ALVIN A. (1974)** ..... Biological Sciences  
B.S., Seattle Pacific College, 1965; Ph.D., Washington State University, 1972. Associate Professor.  
Experience: Assistant Professor, University of Idaho, Washington State University.
- DeJONG, AUGUST (1976)** ..... Director, Career Center  
B.A., Hope College, 1952; M.A., Chapman College, 1967; Ed.D., University of Southern California, 1975.  
Experience: Teacher, Hudsonville High School, Michigan, and Merced High School; purchasing agent, Lith-I-Bar Company, Michigan; management development and communications, Texas Instruments, Inc., Dallas; instructional systems analyst, Santa Clara County Department of Education; executive director, Consortium for Community College Television, Los Angeles.
- DEKLEINE, HERBERT A. (1974)** ..... Mathematics  
B.S., Western Michigan University, 1964; M.A., 1965; Ph.D., University of California, Riverside, 1968. Associate Professor.  
Experience: Assistant Professor, State University of New York.
- DELANY, JAMES E. (1970)** ..... Mathematics  
A.B., San Diego State College, 1961; Ph.D., Iowa State University, 1966. Associate Professor.  
Experience: Graduate assistant, Iowa State University; assistant professor, University of California, Irvine.
- DeLEY, WARREN W. (1971)** ..... Associate Dean, Division of Social Sciences  
A.B., Stanford University, 1956; M.A., 1957; M.A., University of California, Los Angeles, 1963; C. Phil., 1968; Ph.D., 1970. Associate Professor.  
Experience: Teacher, California public schools; Flint Fellowship and teaching assistant, University of California, Los Angeles; director of institutional studies, California State University, Sacramento; lecturer in sociology, California State College, Bakersfield.
- DELVAGLIO, PETER A. (1970)** ..... Graphic Communications  
B.S., Rochester Institute of Technology, 1963; M.A., California Polytechnic State University, 1973. Assistant Professor.  
Experience: Graphic arts salesman, Darien Review, Connecticut; printing liaison, information specialist, U.S. Army, Vicenza, Italy; production control, Higham Printing, Pleasantville, New York, Northwest Publishing, Connecticut; instructor, Stamford school system, Connecticut.
- DEMPSEY, PAUL L. (1970)** ..... Business Administration  
B.B.A., University of Miami, 1951; J.D., 1956; L.L.M., New York University, 1958. Associate Professor.  
Experience: Editor, Prentice-Hall, Inc., New Jersey; attorney, Miami; legal staff, American Telegraph & Telephone Co., New York; chief counsel, New York State Senate Judiciary Committee; real estate broker.
- DETTLOFF, ERLAND G. (1967)** ..... Education  
B.S., Minot State College, 1956; M.A., University of Wyoming, 1962; Ed.D., 1963. Professor.  
Experience: Teacher, Great Falls, Montana; visiting professor, part-time instructor, assistant professor, University of Wyoming; assistant professor, Northern State College, South Dakota.
- DEVORE, JAY L. (1977)** ..... Computer Science and Statistics  
B.S., University of California, Berkeley, 1966; M.S., Stanford University, 1968; Ph.D., 1971. Additional graduate study, Sheffield University, England. Associate Professor.  
Experience: Assistant professor, University of Florida, Oberlin College; visiting professor, Stanford University, Harvard University.

- DIAZ, JOE V. (1976)** ..... Counselor  
 B.A., University of Arizona, 1970; M.Ed., 1971; Ph.D., 1976.  
 Experience: Research assistant, Tucson Public Schools, Tucson; family counseling consultant, Title III project, Tucson; career guidance consultant, K-12, Tucson Public Schools; counselor, secondary schools, Santa Maria; U.S. Navy.
- DICKERSON, ROBERT H. (1970)** ..... Physics  
 B.S., University of Arizona, 1959; M.S., 1963; Ph.D., 1964. Professor.  
 Experience: Physicist, U.S. Naval Ordnance Laboratory; teaching and research assistant, University of Arizona; postdoctoral research associate, University of Illinois; assistant professor, California State College, Hayward.
- DICKEY, RICHARD K. (1956)** ..... Coordinator, Engineering Science; Electronic and Electrical Engineering  
 B.S., University of California, 1948; M.S., 1956; Ph.D., University of California, Santa Barbara, 1969. Professor.  
 Experience: Project engineer, Berkeley Scientific Co.; design engineer, Remler Co., Ltd.; engineer, Alameda Naval Air Station. Registered professional engineer, California.
- DILLS, CHARLES E. (1963)** ..... Chemistry  
 B.S., North Dakota State University, 1949; M.S., George Washington University, 1951; Ph.D., Harvard University, 1956; additional graduate study, Columbia University. Professor.  
 Experience: Professor, Deep Springs College; assistant editor, American Chemical Society; chemist, National Research Corporation; assistant professor, Northwest Missouri State College.
- DINGUS, DELMAR D. (1973)** ..... Soil Science  
 B.S., Berea College, 1966; M.S., West Virginia University, 1968; Ph.D., Oregon State University, 1973. Associate Professor.  
 Experience: Appalachian farming, Scott County, Virginia; soil scientist, USDA Soil Conservation Service, Kentucky; graduate research and teaching assistant, West Virginia University, Oregon State University; research associate, University of Hawaii; soil chemistry and clay mineralogy consultant, Bureau of Land Management, Oregon State University.
- DIRKES, LOIS M. (1973)** ..... Counselor  
 B.S., University of California, Los Angeles; M.S., University of Maryland; Ph.D., 1973. Associate Professor.  
 Experience: Assistant professor, University of Maryland, teaching psychiatric and mental health nursing; group leader and therapist, Human Resources Institute; consultant; public health nurse, Baltimore, and Los Angeles; staff nurse, University of California, Los Angeles.
- DONALDSON, DOUGLAS D. (1968)** ..... Biological Sciences  
 A.B., University of California, Berkeley, 1962; M.A., California State College, Los Angeles, 1964; Ph.D., Oklahoma State University, 1969. Professor.  
 Experience: Herbarium assistant, University of California, Berkeley; unit fellow, Oklahoma Cooperative Wildlife Research Unit, Oklahoma State University; instructor and assistant professor, California State College, Los Angeles.
- DONANT, FRANKLYN D. (1972)** ..... Activities Planning Center  
 B.A., University of California, Santa Barbara, 1967; M.A., California Polytechnic State University, San Luis Obispo, 1972; additional graduate study, University of California, Los Angeles and Arizona State University.  
 Experience: Teacher, Horace Mann Junior High School; head resident and student activities graduate assistant, California Polytechnic State University; research and graduate assistant, Arizona State University.
- DONNELL, ROSEMARY TENER (1977)** ..... Nurse Practitioner  
 R.N., St. Anthony's School of Nursing, Oklahoma City, 1967; A.S., Long Beach City College, 1973; Adult Nurse Practitioner Program, California State University, Los Angeles, 1976; Adult N.P. Certification, 1977.

- DORSEY, MARILYNN F. (1978)** ..... Education  
 A.B., University of California, Los Angeles, 1960; M.Ed., California State University, Northridge, 1969; Ph.D., University of California, Santa Barbara, 1977. Assistant Professor.  
 Experience: High school teacher, Los Angeles; high school counselor, Simi; marriage, family, child counselor, Los Angeles and Atascadero; instructor, California Lutheran College; supervisor, University of California, Santa Barbara.
- DOURSON, ROBERT H. (1967)** ..... Computer Science and Statistics  
 B.S., California Institute of Technology, 1935; M.S., 1941; Ch.E., 1942; additional graduate study, Case Institute of Technology, Southern Illinois University, University of California, Berkeley. Associate Professor.  
 Experience: Laboratory chemist, research chemical engineer, Union Oil Company; research chemist, Cutter Laboratories; laboratory assistant, California Institute of Technology; various engineering and administrative positions, Shell Oil Company.
- DRANDELL, MILTON (1972)** ..... Management  
 B.A., Southern Methodist University, 1944; M.A., University of Texas, 1945; Ph.D., University of California, Los Angeles, 1951. Professor.  
 Experience: Instructor, Southern Methodist University, University of Southern California; operations research specialist, Hughes Aircraft Company, Northrop Aircraft Company; Management Science and Computer Systems coordinator—Management Executive Seminars, applications development manager, International Business Machines Corporation; visiting professor, Graduate School of Management, University of California, Los Angeles; management consultant.
- DRAVES, ALBERT W. (1969)** ..... Construction  
 B.S.M.E., Purdue University, 1948; B.S.C.E., Rensselaer Polytechnic Institute, 1952; M.B.A., Roosevelt University, 1962; additional graduate study, Arizona State University, University of Michigan. Professor.  
 Experience: Civil Engineer Corps, U.S. Navy; director, Operational Development Division, Rex Chainbelt, Inc.; manager, Industrial Building Design Division, De Leuw, Cather & Co., Chicago; instructor, Purdue University. Registered professional civil and mechanical engineer, New York, Louisiana, Indiana, Illinois, California. Registered land surveyor.
- DUARTE, ARTHUR C. (1965)** ..... Agricultural Management  
 B.S., California State Polytechnic College, 1964; M.S., Oregon State University, 1965; Ph.D., Washington State University, 1975. Professor.  
 Experience: Farming, consulting, graduate research assistant, Department of Agricultural Economics, Washington State University, Pullman.
- DUNDON, STANISLAUS J. (1970)** ..... Philosophy  
 B.A., Mt. Carmel College, 1962; M.A., St. John's University, 1965; Ph.D., 1972. Professor.  
 Experience: Teaching fellow, St. John's University; lecturer, University of Santa Clara; consultant, Brasch-Newton Collection in History of Scientific Thought, Stanford University Libraries.
- DUNIGAN, LOWELL H. (1961)** ..... Director, Institutional Research  
 B.S., Iowa State University, 1947; M.S., 1948; additional graduate study, University of Southern California.  
 Experience: Officer, U.S. Navy; instructor in Sociology, Iowa State University; claims adjuster, Employers Mutuals Insurance Company; research technician, California Highway Planning Survey; research technician, California State Department of Education, Division of State Colleges and Teacher Education.
- DUNN, JOHN E. (1948-52) (1961)** ..... Agricultural Engineering  
 B.S., Oregon State University, 1943; M.A., California State Polytechnic College, 1967; M.S., University of Hawaii, 1970. Associate Professor.  
 Experience: Engineering officer, USNR; service supervisor, wholesale farm machinery, Pacific Northwest and Southwest territories, and retail farm machinery, Bakersfield, Yuma, Arizona, and Anaheim; instructor, California State Polytechnic College.

- DUSEK, BERNARD W. (1965)** ..... Art  
 A.B., University of California, Santa Barbara, 1951; M.A., University of Southern California, 1960; additional graduate study, La Jolla California Art Center. Professor.  
 Experience: Instructor, Fullerton Junior College, Palomar Junior College.
- DWYER, GARY COLBURN (1973)** ..... Landscape Architecture  
 B.L.A., Syracuse University, 1967; B.S.L.A., New York State University, 1967; M.A., University of Denver, 1970. Associate Professor.  
 Experience: Assistant landscape architect, U.S. Forest Service and Department of Parks and Recreation; resident, designer and faculty member, Franconia College; partner in charge, Fox Fyre Enterprises; designer, Harmon, O'Donnell & Henninger & Associates; instructor, University of Denver; visiting lecturer, Colorado State University; instructor, Temple Buell College; design consultant, Office of Economic Opportunity; landscape architect, Roark Associates.
- EASTHAM, GEORGE M. (1966)** ..... Acting Head, Economics Department  
 B.A., Chico State College, 1961; M.A., University of California, Santa Barbara, 1965; Ph.D., Claremont Graduate School, 1978. Associate Professor.  
 Experience: Revenue officer, Internal Revenue Service; teaching assistant and research assistant, University of California, Santa Barbara; research assistant, Claremont Graduate School.
- EATOUGH, NORMAN L. (1968)** ..... Chemistry  
 B.S., Brigham Young University, 1947; B.E.S., 1958; M.S., 1959; M.S.Ch.E., 1960; Ph.D., 1968. Professor.  
 Experience: Senior development engineer, Hercules Powder Company; assistant professor, Dixie Junior College; instructor, Brigham Young University.
- EDMISTEN, JOHN W. (1968)** ..... Architectural Engineering  
 B.S., Arch. Engr., California State Polytechnic College, 1965; M.Engr., University of California, Berkeley, 1967. Associate Professor.  
 Experience: Teaching assistant, University of California, Berkeley; project engineer-designer, Reid & Tarics, Architects and Engineers; draftsman, Kenneth Vinolia, Structural Engineer; designer-draftsman, Walter Constant, Structural Engineer. Registered architect, California.
- EGGEN, NORMAN R. (1976)** ..... Animal Science  
 B.S., California State Polytechnic College-Kellogg, 1970; M.S., Texas A&M University, 1974. Assistant Professor.  
 Experience: Foreman, cure and smoke kitchen, Union Packing Co., Los Angeles; manager of processed meats, Urban N. Patman, Inc., Los Angeles; graduate assistant in meats, Texas A&M University; retail meat market research and development, Pitman Industries, Hereford, Texas; vice president and general manager, Meat Mercantile, Costa Mesa.
- EHRENBERG, JAMES R. (1977)** ..... Engineering Technology  
 B.S.M.E., Gonzaga University, 1960; M.S.M.E., Seattle University, 1969. Associate Professor.  
 Experience: Advisory engineer, IBM Corporation, Dallas; senior project engineer, IBM Corporation, Manassas and Poughkeepsie; research engineer, Boeing Company, Seattle; design engineer, General Electric Company, Phoenix and Vandenberg A.F.B.; instructor, Richland College, Texas. Registered professional engineer, California and Texas.
- ELLERBROCK, GERALDINE B. (1973)** ..... Management  
 B.S., Ohio State University, 1941; M.S., 1967; Ph.D., 1970. Professor.  
 Experience: Assistant professor, University of Dayton; management and union consultant; administrative assistant, Ohio State University.
- ELLIOTT, WALT (1965)** ..... Physics  
 B.S., McNeese State College of Louisiana, 1954; M.Ed., Northwestern State College of Louisiana, 1957; M.S., 1963; Ph.D., University of Arizona, 1972. Associate Professor.  
 Experience: Teaching fellow, Northwestern State College of Louisiana; assistant professor of physics and mathematics, Springfield College; visiting professor of physics, Tarrant County Junior Colleges.

- ELTZROTH, THOMAS E. (1967)** ..... Ornamental Horticulture  
 B.S., Ohio State University, 1965; M.S., 1966. Professor.  
 Experience: Research fellow, Ohio State University; garden photographer and writer.
- EMMEL, JAMES R. (1967)** ..... Speech Communication  
 B.A., Eastern Nazarene College, 1945; Speech Therapy Certification, Northwestern University, 1946; M.A., University of Oklahoma, 1950; Ph.D., Pennsylvania State University, 1959. Professor.  
 Experience: Chairman, Department of Speech, Bethany Nazarene College; part-time instructor, Pennsylvania State University; speech consultant, U.S. Dependent Schools, Germany; Fulbright professor, Italy; chairman, Division of Letters, professor, Pasadena College; Head, Speech Communication Department, California Polytechnic State University.
- ENDRES, LELAND S. (1969)** ..... Chemistry  
 A.B., Middlebury College, 1958; M.A., University of Oregon, 1963; Ph.D., University of Arizona, 1966. Professor.  
 Experience: Research and teaching assistant, University of Oregon, University of Arizona; research associate, instructor, University of Nebraska; senior research chemist, 3M Company.
- ENGLUND, DAVID L. (1973)** ..... Head, Child Development Department  
 B.A., Ohio State University, 1956; M.A., University of Hawaii, 1965; Ph.D., University of Wisconsin, 1969. Professor.  
 Experience: Assistant to the dean, College of Arts and Sciences, associate director, Overseas Operations; associate director, Peace Corps Training Programs, University of Hawaii; graduate fellow, University of Wisconsin; assistant professor, Purdue University; U.S. Navy.
- EPSTEIN, GARY M. (1969)** ..... Mathematics  
 B.A., University of California Riverside, 1964; Ph.D., 1969. Associate Professor.  
 Experience: Research assistant, Riverside Cement Co., University of California, Riverside.
- EQUINOA, RICHARD M. (1973)** ..... Director, Placement  
 B.S., California State Polytechnic College, San Luis Obispo, 1967; M.S., 1970.  
 Experience: Instructor, Pacific Grove High School; placement interviewer, placement supervisor, California Polytechnic State University; U.S. Air Force.
- ERICSON, JON M. (1970)** ..... Dean, School of Communicative Arts and Humanities  
 B.A., Pacific Lutheran College, 1952; M.A., Stanford University, 1953; Ph.D., 1961.  
 Experience: Professor and head of Department of Speech and Drama, Central Washington State College; assistant professor and Director of Forensics, Stanford University; assistant professor, Pacific Lutheran College; instructor, Texas Lutheran College.
- ERNATT, EDWARD J. (1958)** ..... Education  
 A.B., Wayne State University, 1946; M.Ed., 1950; Ed.D., University of Michigan, 1956. Professor.  
 Experience: Elementary school teacher, Taylor Center Schools, Michigan; district superintendent, Nankin-Dearborn Schools, Michigan; elementary school teacher, Santa Barbara; supervising teacher, University of California, Santa Barbara College; district superintendent, West Park School District, Fresno.
- EVANS, BERNARD B. (1970)** ..... Computer Science and Statistics  
 B.A., Long Beach State College, 1959; M.S., Kansas State University, 1962; Ph.D., Purdue University, 1964. Professor.  
 Experience: Member of technical staff, Space Technology Laboratories; research assistant, Kansas State University; research associate, Purdue University; member of technical staff, Aerospace Corporation; advisory engineer, IBM; senior staff engineer, Geodynamics Corporation.
- EYLER, MARY F. (1960)** ..... Associate Director, Financial Aid  
 B.S., Western Michigan University, 1959; graduate study, California State Polytechnic College.  
 Experience: Secretary, Simplex Paper Corporation, Adrian, Michigan; Ford Motor Company, Dearborn, Michigan; intermediate stenographer; placement interviewer and Placement Supervisor, California State Polytechnic College; business teacher, San Luis Obispo Adult Evening School; financial aid counselor, California State Polytechnic College.

- FABRICIUS, EUGENE DAVID** (1970) ..... Electronic and Electrical Engineering  
B.S., Missouri School of Mines, Rolla, 1956; M.S., 1958; D.Sc., Newark College of Engineering, New Jersey, 1968. Professor.  
Experience: Associate professor, Rochester Institute of Technology; assistant professor, Newark College of Engineering, New Jersey; National Science Foundation Faculty Fellow; senior physicist, Giannini Controls Corporation, Pasadena; development engineer, Texas Instruments, Inc., Dallas; instructor, Texas A & M University.
- FARBSTEIN, JAY D.** (1974) ..... Architecture  
B.A., University of California, 1965; M. Arch, Harvard University, 1969; Ph.D., University of London, 1975. Assistant Professor.  
Experience: Lecturer, School of Environmental Studies and research assistant, Unit for Architectural Studies, University College, London; architect/planner, Giancarlo De Carlo, Architecture and Planning, Milan, Italy.
- FARRELL, GERALD P.** (1970) ..... Mathematics  
A.B., San Diego State College, 1961; M.S., 1963; Ph.D., University of California, Los Angeles, 1968. Associate Professor.  
Experience: Research assistant, University of California, Los Angeles; assistant professor, California State College, Los Angeles, and Hawaii Loa College, Honolulu.
- FARRELL, WARREN S.** (1967) ..... Agricultural Management  
B.S., California State Polytechnic College, 1963; M.S. University of California, Davis, 1964; Ph.D., 1968. Professor.  
Experience: Research assistant, Agricultural Economics, University of California, Davis.
- FEDERER, M. DALE** (1963) ..... Psychology  
B.S., University of Wyoming, 1951; M.Ed., 1961; Ph.D., 1962. Professor.  
Experience: Officer, U.S. Army; instructor, Saratoga School District, Wyoming; assistant instructor, extension instructor and assistant professor, University of Wyoming.
- FELDMAN, JACOB** (1971) ..... Architectural Engineering  
B.S., Civil Engineering, University of Delaware, 1961; M.S., 1968. Associate Professor.  
Experience: Structural engineer, Simpson, Stratta & Associates, San Francisco; structural designer, Forell/Elsesser, Engineers, San Francisco; architectural engineer, Breck & Associates, Delaware; design engineer, GE Missile/Space Center, Pennsylvania; structural designer, David Bloom, Inc.; highway engineer, U.S. Peace Corps, Washington, D.C.
- FERREIRA, LESLIE S.** (1978) ..... Dairy Science  
B.S., California Polytechnic State University, 1970; M.S., University of Illinois, 1972.  
Experience: Teaching assistant, University of Illinois; vocational agriculture teacher, San Luis Obispo; lecturer, Utah State University.
- FIERSTINE, HARRY L.** (1966) ..... Biological Sciences  
B.S., Long Beach State College, 1957; M.A., University of California, Los Angeles, 1961; Ph.D., 1965. Professor.  
Experience: Student assistant, Los Angeles County Museum; teaching and research assistant, cardio-vascular trainee, University of California, Los Angeles; instructor, Long Beach State College.
- FINCH, HARRY C.** (1962) ..... Biological Sciences  
B.S., Iowa State University, 1946; M.S., 1947; Ph.D., 1950. Professor.  
Experience: Instructor, research associate, Iowa State University; assistant professor, North Carolina State College, Agricultural Experiment Station; associate professor, Pennsylvania State University; project leader, fungicide and nematocide research, Monsanto Chemical Company, St. Louis.

- FINCHUM, WILLIS ARNOLD (1976)** ..... Head, Engineering Technology Department  
B.S., Utah State University, 1949; M.S., 1959; graduate study at Purdue University. Professor.
- Experience: Engineer, Sandia Corporation, Albuquerque, Bell Aircraft Corporation, Point Mugu, and Raytheon Manufacturing Co., Oxnard; missile test engineer, Radio Plane Company, Van Nuys; group supervisor, Coleman Engineering Co., Hurricane, Utah; member technical staff, Ramo Wooldridge; associate professor, Utah State University; professor, Purdue University; head, electrical engineering, University of the Pacific; head, electrical engineering technology, Purdue University. Registered professional engineer, Indiana and Utah.
- FIORITO, BASIL A. (1977)** ..... Child Development.  
B.A., Marist College, 1968; M.S., New York University, 1970; M.A., 1975; Ph.D., Syracuse University, 1977. Assistant Professor.
- Experience: Teaching associate, New York University; high school teacher, Pearl River School District (New York); marriage and family counselor.
- FITTS, JAMES L. (1967)** ..... History  
A.B., Seattle University, 1950; M.A., University of Washington, 1951; Ph.D., University of California, Los Angeles, 1970. Professor.
- Experience: Assistant professor, Immaculate Heart College, San Fernando Valley State College.
- FITZPATRICK, MICHAEL JOHN (1975)** ..... Electronic and Electrical Engineering  
B.S., California State Polytechnic College, San Luis Obispo, 1962; M.S., Ph.D., University of California, Santa Barbara, 1975. Associate Professor.
- Experience: Industrial instructor, U.S. Naval Air Station, Point Mugu; teaching associate, University of California, Santa Barbara; senior servo analysis engineer, Lockheed California Company; lecturer and equipment technician, California State Polytechnic College.
- FLANAGAN, JAMES ROBERT (1959)** ..... Animal Science  
B.S., California Polytechnic State University, 1959; M.S., 1974. Professor.
- Experience: Rancher.
- FLOYD, DONALD R. (1974)** ..... Social Sciences  
B.A., University of California, Berkeley, 1967; M.A., 1968; Ph.D., 1976. Associate Professor.
- Experience: Instructor, University of Maryland; composing room foreman, Garrett Press, San Francisco; assistant foreman, San Leandro *Morning News*; night foreman, W. C. Jones Intertype Services, Los Angeles; U.S. Army.
- FOSTER, THEODORE C. (1970)** ..... Physics  
B.S., University of Santa Clara, 1961; M.S., University of Washington, 1963; Ph.D., 1965. Associate Professor.
- Experience: Assistant engineer, Boeing Scientific Research Labs; research assistant and teaching assistant, University of Washington; assistant research physicist and lecturer, University of California, San Diego; assistant professor, University of Idaho, Montana State University.
- FOUNTAIN, H. PAUL (1965)** ..... Crop Science  
B.S., California State Polytechnic College, 1963; M.S. University of California, Davis, 1974. Associate Professor.
- Experience: Orchard manager, Ballico, California; agriculture inspector, Santa Barbara County.
- FOUTZ, ALAN L. (1973)** ..... Crop Science  
B.S., Colorado State University, 1968; M.S., 1970; Ph.D., University of Arizona, 1973. Associate Professor.
- Experience: Field and laboratory technician, research assistant, Colorado State University; research associate, University of Arizona; general farming and ranching.
- FWLER, ANNE C. (1965)** ..... Social Sciences  
B.A., Douglass College, 1939; M.A., Vanderbilt University, 1959; Ph.D., Tulane University, 1970. Professor.
- Experience: Assistant professor, Nevada Southern University; assistant research sociologist, Council of Social Agencies, New Orleans; research sociologist, Charity Hospital, New Orleans.

- FOX, FRANK W. (1957)** ..... Animal Science  
B.S., California State Polytechnic College, 1951; M.A., 1957. Professor.  
Experience: Director of vocational agriculture, Lassen Union High School, Susanville.
- FREEMAN, HARRIET JO ANNE (1975)** ..... Industrial Engineering  
B.I.E., Georgia Institute of Technology, 1966; M.S., University of Southern California, 1974.  
Assistant Professor.  
Experience: Associate, Adobe Realty; principal, H. J. Freeman Company; project engineer, Olga Company.
- FREY, DENNIS F. (1970)** ..... Biological Sciences  
B.S., Oklahoma State University, 1963; M.S., Virginia State College, 1967; Ph.D., Oklahoma State University, 1970. Associate Professor.  
Experience: Instructor in biology, Classen High School, Oklahoma City Public School District; teaching and research assistant, Oklahoma State University.
- FREY, THOMAS G. (1970)** ..... Chemistry  
B.A., University of Oregon, 1965; Ph.D., University of Idaho, 1970. Associate Professor.  
Experience: Technician, University of Oregon; technician, analyst and teaching assistant, University of Idaho.
- FREY, WINTON H. (1972)** ..... Ornamental Horticulture  
B.S., California State Polytechnic College, 1958; M.S., Fresno State University, 1972. Associate Professor.  
Experience: Graduate teaching and research assistant, University of Washington; instructor, San Luis Obispo Unified School District, Allan Hancock College, California State Polytechnic College; environmental control consultant, Pacific Gas & Electric Company and Kaiser Steel Company Sand & Gravel Division; garden columnist.
- FRIEDMAN, FRED S. (1975)** ..... Engineering Technology  
B.S., University of California, Santa Barbara, 1969; M.S., Loyola University, Los Angeles, 1972. Assistant Professor.  
Experience: Piping and pipe support engineer, Pullman-Kellogg Co., Diablo Canyon; design engineer, Beckman Instruments, Clinical Instruments Division, Fullerton; engineering draftsman, Hughes Tool Company, Culver City. Registered professional engineer, California.
- FRIES, JUDITH L. (1973)** ..... Chemistry  
B.S., Fresno State College, 1966; Ph.D., University of Washington, Seattle, 1971. Associate Professor.  
Experience: Research assistant, teaching assistant, instructor, University of Washington.
- FRIETZSCHE, ARTHUR H. (1965)** ..... English  
B.A., University of California, 1944; M.A., 1945; Ph.D., 1949. Professor.  
Experience: Teaching assistant, lecturer, University of California; supervisor, technical publications, General Electric Company; associate professor, Utah State University.
- FROGGATT, CLARA B. (1964)** ..... Psychometrist  
B.A., University of Wyoming, 1940; M.A., California State Polytechnic College, 1968.  
Experience: Teacher, secondary school, Wyoming; personnel department, United Air Lines.
- FROST, JACK D. (1969)** ..... Industrial Technology  
B.S., Arizona State University, 1959; M.A., California Polytechnic State University, 1972. Associate Professor.  
Experience: Development engineer, Aircsearch Mfg. Co., Phoenix; associate professor, Oregon Technical Institute; senior research engineer, Lockheed Missile and Space Co.; lecturer, South Australian Institute of Technology; project engineer, General Motors, Woodville, South Australia.
- FROST, ROBERT H. (1953)** ..... Head, Physics Department  
A.B., University of California, 1939; M.A., 1945; Ph.D., 1947. Professor.  
Experience: Teaching assistant, University of California; assistant professor, University of Missouri.



- GAINES, MERRILL C. (1976)** ..... Architecture  
B.B.A., University of Wisconsin 1965; M. Arch. 1973.  
Experience: Teaching assistant, University of Wisconsin; designer, Department of City Development; architectural designer, Cook Associates and Miller Waltz, Diedrich, Architects and Associates; architect, Skidmore, Owings and Merrill. Member, A.I.A. Registered architect. Wisconsin.
- GALLAGHER, GAIL (1978)** ..... Registered Nurse  
B.S., California Polytechnic State University, 1970; R.N., Cuesta College, 1972.  
Experience: Staff nurse operating room, Sierra Vista Hospital; office nurse, ophthalmologists.
- GAMBLE, LYNNE E. (1976)** ..... Library  
B.A., University of Texas at Austin, 1968; M.L.S., 1969. Associate Librarian.  
Experience: Acquisitions librarian, University of Texas at Austin.
- GAMBS, ROGER D. (1974)** ..... Biological Sciences  
B.S., University of Idaho, 1963; M.S., 1965; Ph.D., University of Montana, 1973. Associate Professor.  
Experience: Teaching assistant, University of Idaho; instructor, Whitworth College and Wisconsin State University; research and teaching assistant, University of Montana; professor, Arizona Western College.
- GANG, DONNA D. (1967)** ..... Nurse Practitioner  
R.N., Regina General Hospital, Saskatchewan; additional studies, New Jersey State Institute at Greystone Park.  
Experience: Regina General Hospital; Morristown Memorial Hospital, New Jersey; Weyburn Union Hospital, Saskatchewan; Sierra Vista Hospital, San Luis Obispo.
- GANICK, GREGORY L. (1978)** ..... Crop Science  
B.S., California Polytechnic State University, 1970; M.S., 1972. Assistant Professor.  
Experience: U.S. Peace Corps volunteer, Thailand; pest control advisor; ranch superintendent for large commercial vegetable operation.
- GARNER, EDWARD R. (1967)** ..... Mechanical Engineering  
B.S., Bradley University, 1962; M.S., University of Arizona, 1965; Ph.D., Montana State University, 1973. Associate Professor.  
Experience: Instructor, Rose Hulman Institute of Technology; postdoctoral fellow, Montana State University.
- GASKIN, TIMOTHY A. (1970)** ..... Ornamental Horticulture  
B.S., University of California, 1954; M.S., University of Delaware, 1956; Ph.D., Purdue University, 1958; M.B.A., Ohio State University, 1968. Associate Professor.  
Experience: Plant breeder, Asgrow Seed Co., Connecticut; Turfgrass Improvement and Research, Warren's Turf Nursery, Illinois; pesticide development and turf research, O. M. Scotts & Sons, Ohio.
- GEDAYLOO, TEYMOOR (1965)** ..... Physics  
B.A., Macalester College, 1957; M.S., University of Washington, 1959; Ph.D., University of Kansas, 1973. Associate Professor.  
Experience: Laboratory assistant, chief laboratory supervisor, University of Washington; instructor, Lawrence College; teacher and research associate, Argonne National Laboratory.
- GEER, CAROL A. (1973)** ..... Counselor  
B.S., Bowling Green State University, 1960; M.A., Ohio State University, 1964; Ph.D., Colorado State University, 1972. Associate Professor.  
Experience: Counseling psychologist, University of New Mexico; staff psychologist, Colorado State University; school counselor, Kettering, Ohio; high school teacher, Crestline, Ohio.
- GENEREUX, DOUGLAS G. (1970)** ..... Agricultural Management  
B.S., University of Nebraska, 1964; M.S., 1969. Associate Professor.  
Experience: Economic research associate, Management Research Associates; administrative assistant to dean of international programs, and graduate assistant, Department of Agriculture Education, University of Nebraska, instructor, Nehawka Consolidated Schools, Nebraska.

- GENTHNER, FREDERICK L. (1952)** .....Library  
B.A., Ohio Wesleyan, 1940; B.S. in L.S., George Peabody, 1941; A.M.L.S., University of Michigan, 1950. Senior Assistant Librarian.  
Experience: Periodicals librarian, Ball State Teachers College; officer, U.S. Army; assistant reference librarian, Ohio State University.
- GEOHAGEN, LOCKSLEY (1977)** ..... Counselor, Educational Opportunity Program  
B.A., University of California, Los Angeles, 1970; M.A., California Polytechnic State University, 1976; additional graduate study, University of California, Santa Barbara.  
Experience: Instructor, counselor, and educational consultant.
- GEORGE, DAVID L. (1970)** .....Political Science  
A.B., San Diego State College, 1962; M.A., 1968; Ph.D., University of Oregon, 1970; additional graduate study, University of Michigan Survey Research Center. Associate Professor.  
Experience: Teaching assistant, San Diego State College; teaching and research assistant, University of Oregon; NIMH post-doctoral fellow in political psychology, Yale University; visiting lecturer, San Diego State University; instructional computing supervisor, Division of Information Systems, The California State University and Colleges, Los Angeles.
- GERALD, CURTIS F. (1964)** ..... Computer Science and Statistics  
B.S., Iowa State University, 1936; M.S., University of Cincinnati, 1938; Sc.D., Massachusetts Institute of Technology, 1941; additional graduate study, University of Chicago Evening School. Professor.  
Experience: Graduate assistant, University of Cincinnati, Massachusetts Institute of Technology; research fellow, Massachusetts Institute of Technology; research engineer, supervising research chemist, Universal Oil Products Co.; assistant professor, University of Washington; associate director of research, El Paso Natural Gas Products Co. Registered professional engineer, Illinois.
- GERARD, E. DOUGLAS (1951)** ..... Executive Dean  
B.S., University of British Columbia, 1950; M.S., University of Saskatchewan, 1951.  
Experience: Instructor, University of British Columbia; instructor, University of Saskatchewan; shop superintendent, British Columbia Forest Products, Pitt Lake, British Columbia; service manager, Tractor and Allied Equipment, Limited, Melfort, Saskatchewan; associate professor, Agricultural Engineering Department, California Polytechnic State University.
- GERSTEN, ROY (1967)** ..... Director, Associated Students, Inc.,  
Business Affairs and University Union  
B.S., Sacramento State College, 1966; graduate study, Sacramento State College.  
Experience: Staff adviser, Presidential Communications, White House Communications Agency, The White House; Officer, U.S. Army.
- GIBFORD, WILLIAM R. (1955)** ..... Animal Science  
B.S., California State Polytechnic College, 1947. Professor.  
Experience: Horse trainer, Ed Wright Stables and 1001 Ranch, Riverside; horse trainer and horseshoer, San Luis Obispo; employee, Humphrey Meat Packing Company, San Miguel; Pacific Valley Cattle Company, King City; U.S. Marine Corps.
- GILLHAM, JOHN F. (1975)** ..... Acting Head, Landscape Architecture Department  
B.L.A., University of Oregon, 1962; M.L.A., 1966. Professor.  
Experience: Associate professor, assistant professor, University of Oregon; private landscape architecture practice, Eugene, Oregon; visiting critic, University of California, Berkeley; landscape architect, Harman, O'Donnell & Henninger, Denver; landscape architect, City of Eugene.
- GIROLO, JACK E. (1970)** ..... Mathematics  
B.A., San Jose State, 1964; M.S., Iowa State University, 1966; Ph.D., 1971. Associate Professor.  
Experience: Programmer, Sylvania Electronic Systems West; instructor, Drake University; graduate assistant, University of Oklahoma, Iowa State University.

- GLASER, MARGARET J. (1973)** ..... Education  
B.S., Marquette University, 1953; M.Ed., 1970; Ed.D., University of Arizona, 1973. Associate Professor.  
Experience: Elementary teacher, supervising teacher, Milwaukee Public Schools; lecturer, Marquette University, University of Arizona.
- GLASS, L. JOE (1970)** ..... Agricultural Engineering  
B.S., Purdue University, 1962; M.S., Texas A&M University, 1965; Ph.D., 1971. Associate Professor.  
Experience: Engineering aide and student trainee, Soil Conservation Service, Lafayette, Indiana; graduate assistant, instructor, Texas A & M University. Registered professional engineer, California.
- GLASSCO, D. EDWARD (1968)** ..... Mathematics  
B.S., Harvey Mudd College, 1963; M.A., University of Southern California, 1966; Ph.D., 1971. Associate Professor.  
Experience: Teaching assistant, University of Southern California.
- GLIDDEN, WALLACE F. (1961)** ..... Head, Veterinary Science Department  
B.S., California State Polytechnic College, 1952; B.S., University of California, Davis, 1955; D.V.M., 1961. Professor.  
Experience: U.S. Army Veterinary Corps; poultry research, University of California, Davis; large and small animal practice, southern California.
- GOLD, MARCUS (1947-52) (1954)** ..... Audiovisual Service Coordinator  
B.A., University of California, 1942; B.L.S., 1947; additional graduate study, University of California. Professor.  
Experience: U.S. Army; library, University of California; audiovisual librarian, California State Polytechnic College; research assistant, University of California.
- GOLDBERG, SAUL (1970)** ..... Electronic and Electrical Engineering  
B.S., Fairleigh Dickinson University, New Jersey, 1963; M.E., University of Florida, Gainesville, 1964; Ph.D., 1968. Professor.  
Experience: Associate planning engineer, Southern California Edison Co.; assistant professor, University of Miami, Coral Gables; research assistant, University of Florida, Gainesville; project engineer, Bendix Corporation, New Jersey; assistant engineer, Kearfott Company, New Jersey.
- GOLDEN, JAMES R. (1966)** ..... Acting Head, Industrial Engineering Department  
B.S., U.S. Military Academy, West Point, 1945; M.S., Ohio State University, 1961. Professor.  
Experience: Pilot-Navigator, Wing Director of Safety, Strategic Air Command; reliability engineer, Chief of Reliability Quality and Maintainability, Space Systems Division; chief of technical integration, Aero Systems Division, U.S. Air Force. Registered professional engineer, California.
- GOLDENBERG, STUART (1970)** ..... Mathematics  
B.S., University of California, Los Angeles, 1965; M.S., University of California, Riverside, 1969; Ph.D., 1970. Associate Professor.  
Experience: Teaching assistant and teaching fellow, University of California, Riverside; substitute teacher, Riverside Unified Schools.
- GONZALES, LEONARD A. (1972)** ..... Coordinator, School Relations  
B.A., University of Maryland, 1966; additional graduate study, Chapman College.  
Experience: Project engineer, Radar project, India; world wide engineering project officer, Directorate HQ Ground-Electronic Engineering Installation Agency (GEEIA); emergency actions officer and HQUSAFE primary alerting project engineer, command pilot, USAF.
- GOODEN, REGINALD H., JR. (1970)** ..... Political Science  
B.A., University of California, Los Angeles, 1962; M.A., University of California, Santa Barbara, 1969; Ph.D., 1972. Associate Professor.  
Experience: Research assistant, teaching associate, University of California, Santa Barbara.

- GORDON, RAYMOND G. (1967)** ..... Head, Mechanical Engineering Department  
B.S., Western New England College, 1966; M.S., University of Michigan, 1967; Ph.D., University of California, Santa Barbara, 1974. Professor.  
Experience: Design engineer, Universal Design, Inc.; draftsman, Duchess Design and Development, Oriole Engineering Company, Combustion Engineering; laboratory assistant, Western New England College. Registered professional engineer, California.
- GORDON, ROBERT L. (1967)** ..... Ornamental Horticulture  
Kent State University, Kent, Ohio; Graduate, American Floral Art School, Chicago, Illinois. Assistant Professor.  
Experience: Science librarian, Kent State University; designer, Airport Florist, Akron, Ohio; owner, Gordon's Floral Art Shop, Akron; designer-manager, Collin's West Towne Florist and Tauer's Flowers, Akron; assistant director, American Floral Art School, Chicago.
- GOWGANI, GEORGE G. (1970)** ..... Crop Science  
B.S., California State Polytechnic College, San Luis Obispo, 1964; M.A., 1968; M.S., University of Nevada, 1972; Ph.D., 1975. Associate Professor.  
Experience: Director, Agricultural Chemicals, Central Organization of Iranian Farmers Cooperative; research technician, University of California, Davis; research fellow, University of Nevada; research assistant, Desert Biology Phytotron, Desert Research Institute, University of Nevada System.
- GRADY, DAVID V. (1971)** ..... Biological Sciences  
A.B., University of California, Los Angeles, 1964; Ph.D., 1974. Associate Professor.  
Experience: Laboratory assistant, teaching assistant, research assistant, University of California, Los Angeles; lecturer, Mount St. Mary's College.
- GRAHAM, DAVID (1972)** ..... Administrative Assistant, Health Center  
X-Ray Technologist School, Gunter Air Force Base, 1964; B.A., California Polytechnic State University, 1972.  
Experience: X-ray technician, Sierra Vista Hospital, San Luis Obispo; U.S. Air Force.
- GRANT, DAVID M. (1950)** ..... Associate Dean, Academic Planning  
B.A., Iowa State Teachers College, 1935; M.A., University of Iowa, 1940; Ph.D., Stanford University, 1953.  
Experience: Instructor in public schools in Iowa; chairman, Department of Speech, Hastings College, Nebraska; officer, U.S. Navy; instructor, Stanford University; Associate Dean, Graduate Studies, California Polytechnic State University.
- GRANT, DONALD P. (1967)** ..... Architecture  
B. Arch., University of Oklahoma, 1961; M. Arch., University of Utah, 1964; Ph.D., University of California, Berkeley, 1974. Professor.  
Experience: Construction and architectural firms in Utah; Moore Simpson and Partners, London; Ulrich Franzen; Raymond and Rado; Victor Lundy; guest professor Studiengruppe fur System forschung Heidelberg. Registered architect, New York and California; commissioner, San Luis Obispo City Housing Authority.
- GRAVES, R. L., JR. (1951-54) (1957)** ..... Architecture  
B.S., Architecture, University of Kansas, 1948; M. Arch. and Urban Design, Cranbrook Academy of Art, 1950. Professor.  
Experience: Associate professor, Auburn University; assistant professor, University of Florida; instructor, Washington State University; private practice, Kansas City; architectural designer-draftsman with architectural firms in North Carolina, Michigan, California; U.S. Naval Construction Battalion. Registered architect, Kansas.
- GRAVES, THEODORE G. (1947)** ..... Engineering Technology  
B.A., Humboldt State College, 1940; M.S., Oregon State College, 1957. Associate Professor.  
Experience: Instructor, Paia School, Paia, Maui, Hawaii; instructor, Maui High School; teacher, San Francisco; lecturer, University of California, Santa Barbara College; engineering consultant, General Dynamics, Pomona; manufacturing development engineer, General Dynamics, Convair Division.

- GRAY, CONSTANCE H. (1976)** ..... Biological Sciences  
B.S., University of Massachusetts, 1947; M.S., University of Hawaii, 1951; Ph.D., University of California, Berkeley, 1974. Assistant Professor.  
Experience: Instructor, University of Massachusetts; graduate assistant, University of Hawaii; assistant instructor, University of Connecticut; instructor, lecturer, University of California, Berkeley.
- GRAYSON, RANDOLPH L. (1972)** ..... Biological Sciences  
B.A., State University of Iowa, 1958; M.A., Washington University, 1963; Ph.D., Michigan State University, 1972. Associate Professor.  
Experience: Teacher, Detroit Board of Education; Wayne County Community College.
- GREENWALD, HARVEY C. (1973)** ..... Mathematics  
B.S., Massachusetts Institute of Technology, 1964; M.A., Washington University, 1966; Ph.D., 1970. Associate Professor.  
Experience: Instructor, Washington University, St. Louis; University of California, Irvine.
- GRIFFIN, JAMES B. (1971)** ..... Economics  
B.A., University of Illinois, 1956; M.A., Wayne State University, 1963; Ph.D., 1968. Associate Professor.  
Experience: Lt. Col., USAF; graduate teaching assistant, Wayne State University; assistant professor, Chico State College.
- GRIFFIN, ROBERT E. (1976)** ..... Assistant to Foundation Executive Director  
B.S., University of Southern California, 1966; J.D., Western State University, College of Law, 1974.  
Experience: Radio announcer; administrative aide, City of Gardena; officer, U.S. Marine Corps; senior administrative analyst and finance manager, City of Downey.
- GRIMES, JOSEPH E. (1973)** ..... Computer Science and Statistics  
B.A., St. Ambrose College, 1963; M.S., Illinois State University, 1968; Ph.D., Iowa State University, 1973. Associate Professor.  
Experience: Teacher and coach, Central Catholic High School, Bloomington, Illinois; civil engineer, McLean County Highway Department, Bloomington; instructor, Iowa State University.
- GRINDE, DONALD A. (1977)** ..... History  
B.A., Georgia Southern College, 1966; M.A., University of Delaware, 1968; Ph.D., 1974. Associate Professor.  
Experience: Director, Center for Erie Studies, Mercyhurst College Archives; assistant professor, State University of New York at Buffalo.
- GRINNELL, ROBIN R. (1967)** ..... Agricultural Engineering  
B.S., Purdue University, 1955; M.S., University of Minnesota, 1961; Ph.D., Purdue University, 1976. Associate Professor.  
Experience: Research assistant, Iowa State University, Purdue University, University of Illinois; research and teaching assistant, University of Minnesota; student engineer, John Deere Waterloo Tractor Works; assistant professor, University of Guelph, Ontario, Canada; U.S. Army QM and Signal Corps.
- GROSZ, DAVID W. (1967)** ..... Coach, Physical Education  
B.S., University of Oregon, 1960; M.S., 1965.  
Experience: Professional football player, Saskatchewan, Edmonton, Montreal, Oregon; high school biology instructor, Oregon; substitute teacher, Washington; high school physical education instructor and football coach, Hoquiam, Washington; director, summer program, Hoquiam Park Board.
- GROVES, JOHN E. (1968)** ..... Computer Science and Statistics  
B.A., Pasadena College, 1963; M.A., University of California, Riverside, 1965; Ph.D., Kansas State University, 1972. Associate Professor.  
Experience: Teaching assistant, University of California, Riverside; assistant professor, Pasadena College.

- HADLEY, ROBERT E. (1967)** ..... Animal Science  
B.S., California Polytechnic State University, 1955; M.S., 1974. Associate Professor.  
Experience: U.S. Army; show horse trainer, Southern California; stallion manager, Shamel Ranch, Murrieta; large animal veterinary assistant, Murietta; artificial insemination technician-distributor, dairy and beef cattle, Oakdale.
- HAFEMEISTER, DAVID W. (1969)** ..... Physics  
B.S., Northwestern University, 1957; M.S., University of Illinois, 1960; Ph.D., 1964. Professor.  
Experience: Mechanical engineer, Argonne National Laboratory; teaching and research assistant, University of Illinois; post doctoral fellow, Los Alamos Scientific Laboratory; assistant professor, Carnegie-Mellon University.
- HAGGARD, KENNETH L. (1967)** ..... Architecture  
B.S., Texas A & M, 1958; B. Arch., North Carolina State University, 1963; M. Arch., University of Pennsylvania, 1967. Associate Professor.  
Experience: Principal planner, Department of Planning and Renewal, Camden, New Jersey; designer, Pancoast, Ferindino, Grafton and Skeels, Miami; instructor, University of Miami; designer, City Planning & Architectural Associates, North Carolina; research scientist, Radio Biological Laboratory, Balcones Research Center; U. S. Army; tool engineer, Boeing Aircraft. Registered architect, Florida.
- HALE, THOMAS E. (1966)** ..... Mathematics  
B.S., Indiana State University, 1960; M.S., 1963; M.S., St. Louis University, 1967; Ph.D., 1972. Professor.  
Experience: Teacher, Vigo County School Corporation, Terre Haute, Indiana.
- HALL, MICHAEL H. (1974)** ..... Animal Science  
B.S., California Polytechnic State University, 1973; M.S., Kansas State University, 1975. Assistant Professor.  
Experience: Research assistant, Kansas State University; herdsman, Lucky Clover Ranch, Atwater, California and Sutherland Farms, Prospect, Kentucky.
- HALLMAN, BARBARA McCLUNG (1973)** ..... History  
B.A., California State University, Los Angeles, 1960; M.A., 1962; Ph.D., University of California, Los Angeles, 1974. Associate Professor.  
Experience: Assistant professor, Pasadena City College; instructor, California State University, Los Angeles.
- HALLOCK, BRENT G. (1979)** ..... Soil Science  
B.S., University of California, Davis, 1970; M.S., 1972; Ph.D., 1976. Assistant Professor.  
Experience: Extension forest soils specialist, Washington State University; research and teaching assistant, and associate instructor, University of California, Davis; soil conservation technician, U.S. Department of Agriculture.
- HAMER, PATRICIA L. (1975)** ..... Ornamental Horticulture  
B.S., California Polytechnic State University, San Luis Obispo, 1970; M.L.A., California State Polytechnic University, Pomona, 1977; additional graduate study, California Polytechnic State University. Assistant Professor.  
Experience: Landscape designer/draftsperson, Troutner Bros. Landscape Co., San Luis Obispo; floral designer/sales clerk, Flower View Gardens, Inc., Los Angeles; manager, Cal Poly Flower Shop; plant specialist/interior plant designer, The Green Leaf, Los Angeles; visiting lecturer, Universiti Teknologi Malaysia and Institute Teknologi Mara, Kuala Lumpur, Malaysia.
- HAMPTON, JOHN K., JR. (1976)** ..... Head, Biological Sciences Department  
B.S., Millsaps College, 1947; Ph.D., Tulane University Graduate School, 1949. Professor.  
Experience: Professor, Tulane University; professor, chairman, Department of Physiology, Graduate School of Biomedical Sciences, University of Texas; member, University of Texas Dental Science Institute; professor, University of Texas Dental Branch; professor, chairman, Department of Biology, Adelphi University.

- HANKS, CHARLES J. (1954)** ..... Head, Mathematics Department  
B.S., Pennsylvania State Teachers College at Shippensburg, 1942; M.A., University of Pennsylvania, 1949; Ed.D., University of Arkansas, 1954. Professor.  
Experience: Assistant professor, Drexel Institute of Technology; assistant football coach, University of Arkansas; officer, U.S. Coast Guard.
- HANNINGS, DAVID W. (1974)** ..... Ornamental Horticulture  
B.S., Auburn University, 1972; M.S., Cornell University, 1974. Assistant Professor.  
Experience: Research assistant, Cornell University; teaching aide, Auburn University; sales and garden maintenance for garden centers, Morrisville, Pennsylvania; grounds maintenance, Pennsbury Schools, Fairless Hills, Pennsylvania.
- HANNULA, REINO (1962)** ..... Computer Science and Statistics  
B.A., University of California, Los Angeles, 1960; M.A., 1965; additional graduate study, Institute of Computer Science, University of London, Tulane University, University of Massachusetts. Associate Professor.  
Experience: Manager, grocery, Santa Monica; self-employed, Los Angeles; teacher, Redondo Beach High School.
- HANSEN, PHYLLIS JEAN (1963)** ..... Library  
A.B., University of Illinois, 1960; M.S.L.S., 1961. Senior Assistant Librarian.  
Experience: Student assistant, University of Illinois Library; librarian, Queens Borough Public Library; reference librarian, Community Library, San Leandro.
- HANSON, MICHAEL T. (1978)** ..... Natural Resources Management  
B.S., Idaho State University, 1970; M.A., University of Missouri, 1973; Ph.D., Texas A & M University, 1976. Assistant Professor.  
Experience: Teaching assistant, University of Missouri; research assistant, Texas A & M University; instructor, Sam Houston State University.
- HARDEN, F. SHELDON (1948)** ..... Physical Education  
B.A., Santa Clara, 1943; M.A., College of the Pacific, 1950. Professor.  
Experience: Player-coach, Sacramento Nuggets professional football team; playground supervisor, City of Sacramento; Red Cross swimming instructor, San Luis Obispo High School; officer, U.S. Army.
- HARIRI, MAHMUD S. (1971)** ..... Social Sciences  
B.S., Hobart College, 1948; M.A., Columbia University Teachers College, 1953; Ph.D., New School for Social Research, 1968. Professor.  
Experience: U.S. Department of State; assistant professor of educational sociology, American University of Beirut; U.S. Information Agency; U.S. Mission to Iran; head of department of social studies, Beirut College for Women; principal of Broadview School, Saskatchewan; instructor, Evening Division, Monterey Peninsula College; professor and head of department of humanities and pedagogy; dean and registrar, Monterey Institute of Foreign Studies.
- HARMON-ELLIOTT, ADELAIDE T. (1974)** ..... Mathematics  
B.S., Fordham University, 1955; M.S., 1964; Ph.D., New York University, 1969. Associate Professor.  
Experience: Teacher, Cathedral High School, New York City; assistant professor/chairman, Natural Sciences, St. Thomas Aquinas College, New York City; assistant professor, York College of the City University of New York, Queens.
- HARPER, LOUIS W. (1977)** ..... Crop Science  
B.S., Montana State University, 1958; M.S., 1964. Assistant Professor.  
Experience: Grain inspection and seed testing, Montana State University; seed lab supervisor and seed research, Iowa State University; seed certification and production agronomist, U.S. Agency for International Development, Morocco; seed lab supervisor and seed research, University of Kentucky.
- HARPER, RICHARD R. (1968)** ..... Coach, Physical Education  
B.S., University of California, Los Angeles, 1959; M.S., 1960.  
Experience: Assistant freshman coach, University of California, Los Angeles; head football coach, Riverside City College; line coach, Colorado State University, University of California at Santa Barbara, University of Colorado.

- HARR, BERDY V. (1970)** ..... Coach, Physical Education  
B.A., California State University, Long Beach, 1958; M.S., Chapman College, 1972.  
Experience: U.S. Army; teacher/coach, Lynwood Unified School District.
- HARRIGAN, JOHN E., JR. (1969)** ..... Architecture  
B.A., University of California, Berkeley, 1959; M.A., San Jose State College, 1962; Ph.D., Colorado State University, 1966. Professor.  
Experience: Engineering psychologist, Naval Electronics Lab, San Diego; assistant professor, Washington State University; teaching assistant, Colorado State University; supervisor and human factors engineer, Chrysler Corporation; supervisor, human factors research, Martin Company; instructor, Loyola University; engineer, Lockheed Space and Missile Corporation.
- HARRINGTON, JOHN F. (1976)** ..... English  
B.A., Washington State University, 1964; M.A., 1966; Ph.D., University of Illinois, 1970. Associate Professor.  
Experience: Assistant professor, University of Massachusetts.
- HARRIS, JOHN H. (1978)** ..... Natural Resources Management  
B.S., Humboldt State College, 1968; M.S., 1970; Ph.D., Utah State University, 1972. Assistant Professor.  
Experience: Assistant professor, Department of Parks and Recreation, Western Illinois University; research assistant, instructor, Department of Forest Science, Utah State University.
- HARRIS, WALTER L. (1973)** ..... Educational Opportunity Program Counselor  
B.S., California Polytechnic State University, 1973; M.A., 1975.  
Experience: Instructor, Modesto Junior College; consultant, Paso Robles School for Boys; public relations, Atlantic Richfield Gas and Oil Company.
- HARRIS, ROY M. (1954)** ..... Animal Science  
B.S., Utah State Agricultural College, 1952; M.S., 1954; Ph.D., 1970. Professor.  
Experience: Butcher, Swift and Co., Ogden, Utah; breeding herdsman, Suncrest Hereford Ranch, Springerville, Arizona; Gibbs Quarter Horse and Hereford Ranch, Mackay, Idaho; livestock husbandman, Utah State University farm, Logan, Utah; U.S. Army.
- HARTIG, DONALD G. (1979)** ..... Mathematics  
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Wisconsin-Milwaukee, 1966; Ph.D., University of California, Santa Barbara, 1970. Assistant Professor.  
Experience: Teaching assistant, University of Wisconsin-Milwaukee; assistant professor, Ohio University, U.S. Naval Academy.
- HASKELL, CHARLES THOMSON (1963)** ..... Mathematics  
B.A., University of Washington, 1946; M.S., University of Arizona, 1961; Ph.D., 1965. Professor.  
Experience: Teacher, Fallon, Nevada, High School; trust clerk, Peoples National Bank of Washington; trust clerk, assistant trust officer, First National Bank of Nevada; graduate assistant, University of Arizona.
- HASSLEIN, GEORGE J. (1949)** ..... Dean, School of Architecture  
and Environmental Design  
B. of Arch., University of Southern California, 1945.  
Experience: Road and bridge design in Mexico and Central America for Pan-American Highway; airport design for Army Engineers; development work at M.I.T. for Gilfillan Bros.; with architects and practice in Los Angeles area; designer for Summer Spaulding and Wurde-  
man and Becket; chief designer, Kistner, Curtis and Wright. Registered architect, California.  
NCARB Certificate; F.A.I.A.



- HAUSER, RAYMOND J. (1969)** ..... Architectural Engineering  
B.S.A.E., Northrop Institute of Technology, 1955; M.Ed., Chapman College, 1969. Associate Professor.  
Experience: Officer, instructor and jumpmaster, U.S. Army; operations engineer and project engineer, Cornell Aeronautical Laboratory, New York; senior research engineer, Lockheed Missiles and Space Company, Huntsville, Alabama; managing engineer, Impulse Base Flow Facility, Northrop Space Laboratories; senior research engineer, Atlantic Research Corporation.
- HAWES, MICHAEL (1968)** ..... Engineering Technology  
B. Engr., University College, Dublin, Ireland, 1958; M.S., Ohio State University, Dayton, 1967. Associate Professor.  
Experience: Demonstrator, University College, Dublin, Ireland; Electricity Supply Board, Ireland; instructor, Villanova University, Pennsylvania; research engineer, Wright-Patterson Air Force Base, Dayton.
- HAWTHORNE, DANIEL L. (1973)** ..... Psychology  
B.A., University of Minnesota, 1968; M.A., University of California, Berkeley, 1970; Ph.D., 1973. Associate Professor.  
Experience: Teaching associate and research assistant, University of California, Berkeley; Fulbright fellow to India; corporation test analyst for Kaiser Aluminum; research fellow at Institute of Industrial Relations, Berkeley; health manpower evaluator for California legislature; writer.
- HAYES, JAMES H. (1969)** ..... Journalism  
B.A., San Jose State College, 1950; M.A., University of Florida, 1966; additional graduate study, University of Minnesota. Associate Professor.  
Experience: Outstanding Journalism Professor of the year 1978, California Newspaper Publishers Association; part-time copy editor, San Luis Obispo Telegram-Tribune; administrative assistant, College of Liberal Arts, University of Minnesota; assistant professor, University of Arizona; visiting lecturer, American University in Cairo, Egypt; copyeditor, city editor, re-writer, reporter, and photographer on daily newspapers in Washington, D.C., Oklahoma, various newspapers in California and Arizona.
- HAZEBROOK, HARRY (1968)** ..... Electronic and Electrical Engineering  
B.S., Michigan College of Mining and Technology, 1949; M.S., University of Wisconsin, 1951. Professor.  
Experience: Chief systems engineer, Navigation Computer Corporation; engineering manager, Electro-Mechanical Research, Inc.; engineer, General Electric Company, Convair, Jansky and Bailey; instructor, University of Wisconsin.
- HEAD, DWAYNE G. (1966)** ..... Physical Education  
B.S., Jamestown College, 1958; M.S., South Dakota State University, 1963; Ed.D., University of Oregon, 1967. Professor.  
Experience: Instructor, West Fargo High School, University of North Dakota (Ellendale); teaching assistant, South Dakota State, University of Oregon; Fulbright professor, University of Ife, Ile-Ife, Nigeria.
- HEALEY, JOHN R. (1947)** ..... Journalism  
B.A., San Jose State University, 1941; M.S., University of California, Los Angeles, 1964. Professor.  
Experience: Reporter, San Jose News; public relations, McClellan Field, Sacramento; reporter, Sacramento Union; Valley editor, Modesto Bee, outstanding Journalism Educator (university level), California Newspaper Publishers Association, 1970.
- HEATON, RICHARD (1970)** ..... Coach, Physical Education  
B.A., Iowa State Teachers College, 1960; M.A., California State Polytechnic College, San Luis Obispo, 1969.  
Experience: Manager, Peterson Sales & Service, Waterloo, Iowa; part-owner, Heaton Sage Rambler, Waterloo; owner-manager, Heaton Enterprises, Cedar Falls, Iowa; supervisor of recreation, California Mens Colony.

- HECHT, ROBERT W. (1977)** ..... Electronic and Electrical Engineering  
B.S., University of Illinois, 1965; M.S., 1967, Ph.D., 1972. Assistant Professor.  
Experience: Research assistant, University of Illinois; postdoctoral fellow, Argonne National Laboratory; control systems analyst, Sargent and Lundy Engineers, Chicago; assistant professor, Virginia Polytechnic Institute and State University.
- HEINZ, JOHN A. (1953)** ..... Director, Audiovisual  
B.A., University of Washington, 1950; M.A., Ohio State University, 1964.  
Experience: Technical and research assistant, University of Washington; production assistant, Korry Film Productions; free lance photographer, Seattle; production coordinator, Criterion Films, Inc., Seattle; film editor, KRON-TV, San Francisco.
- HENDEL, FRANK J. (1967)** ..... Aeronautical Engineering  
B.S., Polytechnika Lwowska, Poland, 1935; M.S., 1937; Ph.D., 1941. Professor.  
Experience: Consultant and technical specialist, North American Aviation; technical staff, Jet Propulsion Laboratory; engineer, Aerojet General Corp., Wigton-Abbott Corp., Anglo-American Oil Co., Foster-Wheeler, Ltd., Iraq Petroleum Co.; instructor, Polytechnika Lwowska.
- HENDRICKS, FRANCIS (1969)** ..... City and Regional Planning  
A.B., University of California, Berkeley, 1950; M.City & Regional Planning, 1953. Professor.  
Experience: Associate research professor, University of Pittsburg; lecturer, Stanford University; partner, Planning Research Associates, San Francisco; senior consultant, Arthur D. Little, Inc., Cambridge, Massachusetts; principal, Francis Hendricks & Assoc.; principal planner, 12th Naval District, U.S. Navy; private planning consultant, California; planner, City of Sausalito.
- HENRY, DAVID R. (1976)** ..... Speech Communication  
A.B., University of California, Berkeley, 1970; M.A., University of California, Davis, 1974; Ph.D., Indiana University, 1976. Assistant Professor.  
Experience: Teaching assistant, University of California, Davis; associate instructor, Indiana University.
- HENRY, EDWARD T. (1977)** ..... Veterinary Science  
D.V.M., School of Veterinary Medicine, University of California, Davis, 1974.  
Experience: Large animal practice, San Joaquin Valley.
- HENSEL, DONALD W. (1960)** ..... History  
B.S., University of North Dakota, 1949; M.A., University of Colorado, 1953; Ph.D., 1957. Professor.  
Experience: Graduate assistant, University of Colorado, Boulder; instructor in history and coordinator of Arts and Sciences instruction, University of Colorado, Denver.
- HERLIHY, JOHN J. (1975)** ..... Agricultural Management  
B.S., Manhattan College, N.Y., 1962; graduate study, University of Southern California. Assistant Professor.  
Experience: Sales and marketing executive, Wilson & Geo. Meyer & Co., Chemicals and Fertilizers; farming, Central California.
- HESCH, EARL R. (1956)** ..... Engineering Technology  
B.S., University of New Mexico, 1955; M.S., Oklahoma A. & M. College, 1956. Associate Professor.  
Experience: U.S. Army; draftsman, Los Alamos Scientific Laboratory; survey party chief, C. H. Cole; surveyor-draftsman, City of Albuquerque.
- HEWITT, CLARISSA (1976)** ..... Art  
B.A., California State University, Northridge, 1971; M.F.A., Cranbrook Academy, 1976. Assistant Professor.  
Experience: Instructor, Community Services; Charles Stewart Mott Community College, Flint, Michigan.

- HICKS, WILLIAM R. (1957)** ..... Physical Education  
B.S., University of California, Los Angeles, 1950; M.A., Long Beach State College, 1959.  
Professor.  
Experience: United States Army; teacher, Long Beach City Schools; coach, Wilson High School, Long Beach, and Long Beach City College; football, baseball, and golf coach, California Polytechnic State University.
- HILL, PATRICK D. (1975)** ..... Architecture  
A.A.S., Purdue, 1965; B. Arch., University of Illinois, 1970; M.S., 1972. Assistant Professor.  
Experience: Lecturer, Fourth Year Design Studio, School of Architecture, University of Illinois; associate partner, designer, Simon, Rettberg, Garrison & Flom, Inc., Champaign, Illinois; designer/senior draftsman, Research and Development Group, U.S. Reduction Co., NASA/ASEE Faculty Fellow, Stanford University/Ames Research Center; finalist, Francis J. Plym Fellowship, University of Illinois; private practice, Champaign, Ill.; registered architect, Illinois, California. Member: AIA, SCARAB, NCARB certified.
- HILL, ROBERT W. (1976)** ..... Accounting  
B.S., University of California, Berkeley, 1956; M.B.A., 1968; D.B.A., University of Southern California, 1975. Associate Professor.  
Experience: Staff accountant, Arthur Young and Co., San Francisco; controller, Pacific Delta Gas, Inc., secretary/treasurer, Kelley-Moore Paint Co., San Carlos; assistant professor, California State University, Fresno and California State University, San Jose; instructor, University of Southern California; associate professor, California State University, Hayward; CPA.
- HINKLE, THOMAS L. (1972)** ..... Coach, Physical Education  
B.S., California Polytechnic State University, 1966.  
Experience: Teacher and coach, Mt. San Antonio Junior College, Lynwood High School, Bishop Amat High School.
- HITCHCOCK, VAUGHAN D. (1962)** ..... Physical Education  
B.S., Washington State University, 1956; M.A., San Francisco State, 1965. Professor.  
Experience: Physical education instructor, football and wrestling coach, Castro Valley High School; physical education instructor, football and wrestling coach, Hayward High School; teacher, Juvenile Hall, Alameda County Special Schools; playground, swimming and recreation director, Hayward Area Recreation Department.
- HIKSON, DOROTHY F. (1974)** ..... Registered Nurse  
R.N., Salem Hospital School of Nursing, 1945; graduate studies, University of California, Santa Barbara Extension, Cuesta College.  
Experience: Night supervisor relief, Salem Hospital, Massachusetts; general duty nurse, Jackson Memorial Hospital, Miami; clinic nurse, Fresno; general duty nurse, John C. Fremont Hospital, Mariposa, French Hospital, San Luis Obispo General Hospital.
- HOFFMAN, KENNETH A. (1974)** ..... Physics  
B.A., University of California, Berkeley, 1966; M.A., 1969; Ph.D., 1973. Associate Professor.  
Experience: Research assistant, University of California, Berkeley; research fellow, University of Minnesota.
- HOFFMANN, JON A. (1968)** ..... Aeronautical Engineering  
B.S., University of Wisconsin, 1964; M.S., 1966; additional graduate study, Wisconsin State University. Professor.  
Experience: Draftsman, Marathon Electric, Wausau, Wisconsin; engineer, Chemstrand Corporation, Pensacola, Florida; research engineer, Caterpillar Tractor, Peoria, Illinois; instructor, University of Wisconsin; research engineer, Trane Company, LaCrosse, Wisconsin.
- HOLLAND, V.L. (1972)** ..... Biological Sciences  
B.A., Fresno State College, 1966; M.A., 1969; Ph.D., University of California, Berkeley, 1973. Associate Professor.  
Experience: Teaching assistant, Fresno State College; research assistant, teaching assistant, teaching associate, assistant professor, University of California, Berkeley; visiting professor, University of California, Berkeley, Sagehen Creek Field Station.

- HOLLEY, F. JERALD (1961)** ..... Director, Admissions, Records and Evaluations  
B.S., Utah State University, 1961; M.A., California State Polytechnic College, 1968.  
Experience: U.S. Air Force; private business, Rexburg, Idaho.
- HOLTZ, WALTER E. (1954-66) (1968)** ..... Head,  
Environmental Engineering Department  
B.S., Illinois Institute of Technology, 1949; M.S., California Institute of Technology, 1953;  
M.S., University of Washington, 1964. Professor.  
Experience: Professor, California State Polytechnic College, Pomona; project engineer, Baker Engineering Corp.; engineer, Carrier Corp.; engineer, U.S. Naval Air Missile Test Center; U.S. Air Force; consultant, USAID. Registered professional engineer, California.
- HOLZ, ALAN W. (1974)** ..... Mathematics  
B.A., University of Washington, 1963; M.A., Bowdoin College, 1968; Ph.D., Purdue University 1972. Associate Professor.  
Experience: Teacher, North Kitsap High School, Poulsbo, Washington, The Charles Wright Academy, Tacoma; assistant professor, Prairie View A & M College, Texas; research and teaching assistant, Purdue University; evaluation specialist, Gemrel, Inc., St. Louis.
- HOMAN, DENNIS N. (1966)** ..... Biological Sciences  
B.A., University of Iowa, 1955; M.S., 1958; Ph.D., 1960. Professor.  
Experience: Instructor, University of Iowa; assistant professor, Illinois State University; associate professor, Wisconsin State University.
- HONEGGER, HARRY H. (1961)** ..... Metallurgical Engineering  
B.S.M.E., Oregon State College, 1950; M.S.M.E., 1952. Professor.  
Experience: Welder, Oregon Shipyards; U.S. Army; laboratory supervisor, Metallurgical Engineers, Inc. Registered professional engineer, Oregon, California.
- HOOD, J. MYRON (1977)** ..... Mathematics  
B.A., Grinnell College, 1963; M.S., Northwestern University, 1965; Ph.D., Washington University, 1970. Assistant Professor.  
Experience: Teaching assistant, Northwestern University; teaching and research assistant, Washington University; assistant professor, Occidental College; research associate, California Institute of Technology; consultant: TRW, Southern California Edison, Lockheed Marine.
- HOOKS, ROBERT D. (1966)** ..... Animal Science  
B.S., California State Polytechnic College, 1961; M.S., Iowa State University, 1964; Ph.D., 1966. Professor.  
Experience: Swine herdsman, State College of Washington, Pullman; manager and part-owner, orchard and swine farming enterprise, Orland, California; U.S. Marine Corps.
- HOOVER, ROBERT L. (1970)** ..... Acting Head, Social Sciences Department  
A.B., University of California, Berkeley, 1965; M.A., 1969; Ph.D., 1971; additional graduate study, University of California, Berkeley, Stanford University. Associate Professor.  
Experience: University of California archaeological survey, Berkeley; graduate assistant, University of California, Berkeley; instructor, Merritt College, Oakland; visiting professor, Stanford University; midshipman, U.S. Navy; editor and chief archaeologist, San Luis Obispo County Archaeological Society.
- HORTON, WILLIAM F. (1968)** .. Associate Dean, School of Engineering and Technology  
B.S., California Institute of Technology, 1946; M.S., 1948; Ph.D., University of California, Los Angeles, 1966. Professor.  
Experience: Department head, senior staff engineer, Hughes Aircraft Company; design specialist, section head, Lear Sigler, Inc.; engineer, Westinghouse Electric; research engineer, associate in engineering, University of California, Los Angeles.
- HOSTETTER, H. CLYDE (1958)** ..... Communications/Media Productions  
B.J., University of Missouri, 1949; graduate study, University of Missouri, University of Southern California, American University, Arizona State University.  
Experience: Officer, U.S. Navy; public relations director, Kansas Industrial Development Commission; United States Junior Chamber of Commerce; public relations consultant, Hughes Aircraft Company; associate editor, Farm Journal, Inc.; free-lance multi-media producer.

- HOULGATE, LAURENCE D. (1979)** ..... Philosophy  
B.A., California State University, Los Angeles 1960; M.A., Ph.D., University of California, Los Angeles, 1967. Associate Professor.  
Experience: Associate professor, George Mason University, Reed College; assistant professor, University of California, Santa Barbara; lecturer, California State University, Fullerton.
- HOULIS, JEROME F. (1959)** ..... Chemistry  
B.S., California State Polytechnic College, 1958; graduate study, California State Polytechnic College. Assistant Professor.  
Experience: Electronics maintenance, U.S. Air Force.
- HOUSTON, ERNEST R. (1957)** ..... Ornamental Horticulture  
B.S., Oklahoma State University, 1943; M.S., Ohio State University, 1947; additional graduate study, Oklahoma State University. Professor.  
Experience: Assistant professor, Oklahoma State University; manager of plant shipments, Furrow and Co., Guthrie, Oklahoma; grower and consultant, Higdon Flower Shop and Nursery, Oklahoma City; U.S. Army.
- HOWARD, LORRAINE H. (1964)** ..... Associate Dean, Women  
B.S., Oregon State College, 1945; Ed.M., Oregon State University, 1961; Ph.D., 1964.  
Experience: Assistant buyer, Meier & Frank Co., Portland; assistant chemist, Hawley Pulp and Paper, Oregon City; assistant to director, Fruit & Flower Day Nursery, Portland; teacher, Oregon State University.
- HOWELL, ROBERT (1974)** ..... Art  
B.A., Brooks Institute, 1973; M.A., Pepperdine University, 1976. Associate Professor.  
Experience: Teacher, Marine Science Institute, Guymas, Mexico; instructor, Brooks Institute; self-employed, Howell Productions.
- HOYT, HOMER E. (1969)** ..... Education  
Ed.B., Rhode Island College of Education, 1940; M.A., University of California, Berkeley, 1956. Associate Professor.  
Experience: Executive director, Northern San Joaquin Valley Counties Supplementary Education Center; district superintendent, Healdsburg High School and Elementary School Districts; assistant superintendent, instructional services, San Luis Obispo County Schools; elementary and junior high school principal, San Rafael City Schools.
- HSIEH, CARL C. F. (1970)** ..... Architectural Engineering  
B.S., National Taiwan University, 1961; M.S., So. Dakota School of Mines and Technology, 1965; Ph.D., Northwestern University, 1968. Professor.  
Experience: Engineering officer, ROTC Nationalist Chinese Airforce, Taiwan; structural engineer, Taiwan Public Works Bureau; research fellow, South Dakota School of Mines and Technology; research assistant, Northwestern University; body research engineer in computer-aided design and advance development, Chrysler Corporation; senior engineer, Bechtel Corporation, San Francisco; NASA-ASEE Research Fellow, NASA Flight Research Center, Edwards Air Force Base, California. Registered professional engineer, California.
- HSU, JOHN Y. S. (1970)** ..... Computer Science and Statistics  
B.S., National Taiwan University, 1959; M.S., University of California, Berkeley, 1964; Ph.D., 1969. Professor.  
Experience: Research engineer, Broadcasting Corporation of China; teaching fellow, research assistant and reader, University of California, Berkeley; research engineer, Berteau Corporation; project engineer, Librascope and Fairchild Core Memory; computer architect, Varian Data Machines Consultant, ILLIAC IV Project and Federal Electric Corporation/ITT; national lecturer of ACM; research fellow, NASA/Ames Research Center.
- HUEHN, KEMPTON L. (1968)** ..... Mathematics  
B.S., Iowa State University, 1957; M.S., 1962; Ph.D., Colorado School of Mines, 1974. Associate Professor.  
Experience: Member technical staff, T.R.W. Systems Group; instructor, Iowa State University, Colorado School of Mines.

- HUFF, EARL D. (1970)**..... Head, Political Science Department  
B.A., San Francisco State College, 1959; M.A., University of Idaho, 1969; Ph.D., 1971. Associate Professor.  
Experience: Instructor, Solano College, Vallejo, California; chairman, Social Studies Department, Solano Junior High School, Vallejo; Fulbright exchange teacher, England; NSF fellow, University of Idaho; Fulbright fellow, American University of Beirut, Lebanon, and Delhi, India.
- HUOT, ROBERT J. (1963)**..... English  
B.A., University of Washington, 1946; M.A., 1951; Ph.D., University of Utah, 1971; additional graduate study. Professor.  
Experience: Salesman and sales instructor, A. S. Aloe Surgical Supply Company; teaching fellow, University of Washington; instructor, Tulane University; associate, University of Washington; instructor, Montana State University; graduate assistant, University of Utah.
- HUTCHINSON, JAMES R. (1971)** ..... Graphic Communications  
B.F.A., Carnegie Institute of Technology, 1955; B.S., 1959; M.A., California State University, Dominguez Hills, 1977. Associate Professor.  
Experience: Vice president, advertising art and production, The Albert Woodley Co., Inc.; senior media planner, Young and Rubicam, Inc.
- HUTTON, REX L. (1966)** ..... Mathematics  
B.S., Baldwin Wallace College, 1959; M.S.T., Illinois Institute of Technology, 1964; Ed.D., Arizona State University, 1972. Professor.  
Experience: Teacher, Brooklyn Junior High School; research assistant, Education Research Council of Greater Cleveland; instructor, Cuyahoga Community College.
- HYER, EDGAR A. (1951)**..... Head, Agricultural Management Department  
B.S., Utah State College, 1939; M.S., 1942; Ph.D., Cornell University, 1948; Post-graduate work, Iowa State University. Professor.  
Experience: Land use economist, Utah; field supervisor of A.A.A., Utah; economist, U.S. Forest Service, Ogden, Utah; U.S. Army; graduate assistant, Cornell University; assistant professor of agricultural economics, Oregon State College.
- HYNES, C. DENNIS (1957)** ..... Biological Sciences  
B.A., Macalester College, 1951; M.S., University of Michigan, 1953; Ph.D., University of Florida, 1957. Professor.  
Experience: Museum assistant, University of Michigan; teaching assistant and research assistant, University of Florida.
- IKENOYAMA, GEORGE K. (1964)** ..... Architecture  
B.S., California State Polytechnic College, 1955; M.Arch., University of Hawaii, 1972. Professor.  
Experience: Draftsman and associate, John Badgley; private practice, California; lecturer, California State Polytechnic College; visiting lecturer, University of Hawaii. Registered architect, California.
- IQBAL, M. ZAFAR (1979)** ..... Accounting  
B.S., University of Nevada, Reno, 1969; M.B.A., Northern Illinois University, 1972; Ph.D., University of Nebraska, Lincoln, 1979. Professor.  
Experience: Instructor, University of Nebraska, Lincoln; assistant professor, College of St. Thomas; chairman, Department of Business and Accounting, Briar Cliff College; administrative assistant, Price Waterhouse & Co.; assistant controller, Holt Brothers; C.M.A.; C.P.A., Iowa.
- ITZKOWITZ, HOWARD F. (1974)** ..... Architecture  
B. Arch., Rice University, 1963; M. Arch., Cranbrook Academy of Art, 1974. Associate Professor.  
Experience: Architect, Ann Arbor, Michigan, and San Francisco; project architect, Hertzka & Knowles; designer, Mario J. Ciampi; designer, Emery Roth & Sons; designer, Port of New York Authority, Aviation Planning Department.

- JACKSON, JUDY S. (1977) .....Registered Nurse  
R.N., Cuesta College, 1970.  
Experience: Registered nurse, San Luis Obispo General Hospital; USPHS Hospital, Talihina, Oklahoma; operating room supervisor, Ontario Community Hospital; clinic director, Community Health Project, West Covina.
- JACOBS, JAMES W. (1967) ..... Animal Science  
B.S., Oklahoma State University, 1967; M.S., California Polytechnic State University, 1975.  
Associate Professor.  
Experience: Livestock showing, judging, and ranching operations.
- JACOBSON, RALPH A. (1965) ..... Chemistry  
B.A., Montclair State College, 1962; Ph.D., Cornell University, 1966. Associate Professor.  
Experience: Research fellow, California Institute of Technology; assistant professor, University of Oklahoma.
- JAMES, RUTH H. (1971) ..... Home Economics  
B.S., Iowa State University, 1943; M.A., California State College, Los Angeles, 1960; Ed.D., University of California, Los Angeles, 1968. Professor.  
Experience: Teacher, Chowchilla Union High School and Carmel Unified Schools; home economist, Southern California Gas Company; lecturer, California State College, Los Angeles; counselor, School of Education, University of California, Los Angeles; instructor, California State College, Long Beach; assistant professor, San Fernando Valley State College.
- JAMESON, GLORIA (1967) .....English  
B.A., Texas Woman's University, 1941; M.A., Teacher's College, Columbia University, 1944; Ph.D., University of Texas, 1966. Professor.  
Experience: Librarian, Galveston Public Schools; elementary teacher in Houston, San Antonio, Texas; Muskogee, Oklahoma; and Montgomery County, Maryland; consultant in education, Montana, and Christ Church, Alexandria, Virginia; professor of English, Ewha Woman's University, Seoul, Korea; research associate, linguistics, University of Texas; director, intensive English, Vietnamese Leadership/Scholarship Program.
- JANESICK, VALERIE J. (1978) ..... Education  
B.S., Eastern Michigan University, 1970; M.A., Bowling Green State University, 1971; Ph.D., Michigan State University, 1977. Assistant Professor.  
Experience: Instructor, Michigan State University; instructor, Lansing Community College; research associate, Institute for Research on Teaching; graduate assistant, Bowling Green State University, Michigan State University.
- JANEWAY, ROBERT K. (1972) .....Engineering Technology  
B.S., California State Polytechnic College, 1951; M. Engr., California Polytechnic State University, 1975. Associate Professor.  
Experience: Senior research engineer, Engineering Supervisor Autonetics Division, North American Aviation, Inc.; engineering manager, Montedoro Corp., San Luis Obispo. Registered professional engineer, California.
- JANKAY, PETER (1973) ..... Biological Sciences  
B.A., San Fernando Valley State University, 1966; M.S., 1969; Ph.D., University of California, Santa Barbara, 1973. Associate Professor.  
Experience: Technical assistant, graduate assistant, lecturer, equipment technician, San Fernando Valley State University; teaching associate, University of California, Santa Barbara.
- JENKINS, STARR (1961) .....English  
B.A., University of New Mexico, 1948; M.A., Stanford University, 1959; Ph.D., University of New Mexico, 1972. Professor.  
Experience: Navy and Army; instructor, Albuquerque Public High Schools; laborer, firefighter, smokejumper and aerial observer with U.S. Forest Service, California, Oregon, Montana, and Idaho; national park ranger, Yosemite; information specialist (writer-photographer), U.S. Forest Service, Southwestern Regional Office, Albuquerque, New Mexico; free-lance writer-photographer.

- JENNINGS, CHARLES W. (1968)** ..... Art  
B.A., Wheaton College, 1966; M.A., M.F.A., Northern Illinois University, 1968. Associate Professor.  
Experience: Factory worker, IBM; graduate assistant, Northern Illinois University.
- JOHNSON, BOYD WALKER (1969)** ..... Mathematics  
B.S., United States Naval Academy, 1951; M.S., North Carolina State College, 1956; Ph.D., North Carolina State University, 1963. Professor.  
Experience: Assistant professor. U.S. Air Force Academy and Florida Presbyterian College; dean of men, Florida Presbyterian College.
- JOHNSON, CORWIN M. (1961)** ..... Head, Crop Science Department  
B.S., State College of Washington, 1950; M.S., 1951; Ph.D., Cornell University, 1953. Professor.  
Experience: Field and laboratory technician, research assistant, Department of Agronomy, State College of Washington; research assistant, Department of Agronomy, Cornell University; research agronomist, Northwestern Washington Experiment Station; assistant professor and agronomist, Mississippi State University.
- JOHNSON, ERIC V. (1969)** ..... Biological Sciences  
B.A., Brown University, 1964; Ph.D., Cornell University, 1969. Associate Professor.  
Experience: Teaching and research assistant, assistant curator of birds, Cornell University.
- JOHNSON, MEAD R. (1956)** ..... English  
B.A., University of Denver, 1939; M.A., 1949; additional graduate study, University of Denver. Professor.  
Experience: Advertising manager, Sterling (Colorado) Farm Journal; U. S. Army; instructor in Colorado and California public schools; instructor, Colorado School of Mines; associate professor, Central Missouri State College.
- JOHNSON, MILES B. (1957)** ..... English  
B.A., Gustavus Adolphus College, 1947; M.A., University of Minnesota, 1951; M.A., University of Denver, 1953; M.A., University of Iowa, 1966; additional graduate study, University of Washington, University of Southern California, University of Iowa. Associate Professor.  
Experience: Instructor and publications adviser, Florence State College; instructor and publications chairman, Memphis State University; instructor, University of Tennessee, Memphis; assistant professor, Luther College; instructor, University of Puget Sound; presidential assistant, Johnson Wholesale and Manufacturing Company; author.
- JOHNSON, RICHARD F. (1950)** ..... Head, Animal Science Department  
B.S., Iowa State College, 1942; M.S., State College of Washington, 1947. Professor.  
Experience: U.S. Army; instructor, College of Agriculture and assistant animal husbandman, Experiment Station, State College of Washington, Pullman.
- JOHNSON, WILLIAM V. (1966)** ..... Music  
B.M.E., Indiana University, 1962; M.M., University of Michigan, 1966. Professor.  
Experience: Instrumental music instructor, Seeger Memorial High School, Indiana; assistant to conductor and member of band staff, University of Michigan; visiting conductor, California State University, Northridge.
- JOHNSTON, THOMAS V. (1967)** ..... Associate Dean, Communicative Arts and Humanities and Head, Art Department  
Diploma of Teaching, New Zealand, 1948; Visual Arts Certificate, London University, 1950; D.A., Glasgow School of Art and Architecture, 1952. Professor.  
Experience: Head, Department of Art, California Polytechnic State University, San Luis Obispo, Palmerston North Teachers College, New Zealand and Waihi College, New Zealand; lecturer, Glasgow School of Art and Architecture; newspaper art critic; internationally recognized sculptor.
- JONES, DANE R. (1976)** ..... Chemistry  
B.A., University of Utah, 1969; Ph.D., Stanford University, 1974. Assistant Professor.  
Experience: Research assistant, Kennecott Research Center; instructor, DeAnza Community College; teaching and research assistant, Stanford University; research associate, University of Uppsala, Sweden; instructor/research associate, University of Utah.



- JONES, DOUGLAS C. (1976)** ..... Student Activities Information Director  
B.A., University of California, Los Angeles, 1971.  
Experience: U.S. Army Public Information, Vietnam, Okinawa; public information coordinator, Riverside Art Center and Museum; journalist: Los Angeles Herald-Examiner, The Hollywood Reporter, Los Angeles Times, Rolling Stone Magazine; instructor, Immaculate Heart College, University of California at Riverside, American Film Institute, Center for Advanced Film Studies; book critic and radio commentator.
- JONES, HAZEL J. (1974)** ..... Vice President for Academic Affairs  
B.A., Western State College, Colorado, 1938; M.A., University of California, Berkeley, 1943; M.Ed., University of Southern California, Los Angeles, 1958; Ed.D. 1963.  
Experience: Teacher, Colorado and California Schools; English department chair, director of in-service education, Whittier Schools; professor, California State University, Los Angeles; professor of English and dean, School of Humanities and Social Sciences, California State University, Fullerton.
- JONES, JACK B. (1969)** ..... Education  
B.A., University of California, Santa Barbara, 1957; M.A., 1965; Ed.D., University of Arizona, 1970. Professor.  
Experience: Administrative officer, U.S. Army; sergeant, Santa Barbara Police Department; elementary teacher, Santa Barbara, Goleta; graduate assistant, University of Arizona; instructor, Ventura College.
- JONES, RICHARD V. (1969)** ..... Education  
A.B., Fresno State College, 1949; M.A., 1952; Ed.D., University of California, Berkeley, 1958. Professor.  
Experience: Teacher, Fresno City Schools; consultant in Field Service, research assistant, staff associate and director of research, extension teacher, University of California; principal, Petaluma Senior High School; superintendent, Oroville Union High School District; director of continuing education and placement services, Chico State College.
- JORGENSEN, NANCY ANN (1968)** ..... Counselor  
B.A., University of Hawaii, 1957; graduate study, Institute of Psychology, University of Paris, University of Hawaii, University of California, Santa Barbara, University of Nevada, Reno. Associate Professor.  
Experience: Graduate assistant, University of Hawaii; psychometrist, California State Polytechnic College; senior psychometrist, University of California, Berkeley; junior assistant-research, University of California, Los Angeles; psychometrist and associate psychologist, San Luis Obispo County Community Mental Health Services.
- JUDD, W. BOYD (1956)** ..... Mathematics  
B.S., St. Mary's College, 1939; M.A., University of California, 1951; D.Ed., Pennsylvania State University, 1969. Professor.  
Experience: High school teacher, California; instructor, Army specialized training program, University of Santa Clara; research mathematician, University of California; computer laboratory, in charge of statistical operations, Bureau of Research and Guidance, Office of Los Angeles County Superintendent of Schools; tabulator machine supervisor, State of California, Department of Public Health; participant in National Science Foundation Institute, New Mexico State University.
- KABAT, HERBERT R. (1952)** ..... Physics  
B.S., United States Naval Academy, 1938; M.A., Stanford University, 1951; additional graduate study, University of Southern California, Stanford University, University of Colorado. Professor.  
Experience: Officer, U.S. Navy; research analyst, Rheem Mfg. Co.; instructor, Pasadena City College, College of the Sequoias.
- KALATHIL, JAMES S. (1965)** ..... Physics  
B.S., University of Madras, 1956; M.A., Southern Illinois University, 1963; Ph.D., University of Nevada, 1977. Associate Professor.  
Experience: Instructor, Frostburg State College; graduate fellow, University of Nevada; research associate, Desert Research Institute; assistant, U.S. Embassy, Kabul, Afghanistan.

- KANE, JOHN J. (1969)** ..... Mechanical Engineering  
B.S., U.S. Naval Academy, 1951; M.S., University of Pittsburgh, 1959; Ph.D., 1961. Professor.  
Experience: Adjunct Professor, University of Pittsburgh; engineer, Westinghouse Electric Corporation, Pittsburgh; lecturer, University of Southern California; member technical staff, Aerospace Corporation; self-employed, Sales Management; officer, U.S. Marine Corps.
- KANN, DAVID J. (1969)** ..... English  
B.A., Brandeis University, 1964; M.A., New York University, 1966; Ph.D., Occidental College, 1971. Associate Professor.  
Experience: Teaching associate, Occidental College; instructor, Polytechnic School, Pasadena; resident fellow, Esalen Institute, Big Sur, 1971; postdoctoral fellow, Center for the Psychological Study of the Arts, SUNY, Buffalo, 1976.
- KATEKARU, JAMES (1969)** ..... Chemistry  
B.S., University of Oregon, 1956; M.S., University of Arizona, 1961; Ph.D., University of Cincinnati, 1965. Associate Professor.  
Experience: Research assistant, University of Arizona; analytical chemist, Federal Food and Drug Administration; teaching assistant, University of Cincinnati; research chemist, North American Aviation; editor, Chemical Abstract Service; chemist, Naval Radiological Defense Laboratory.
- KAY, THOMAS D. (1958)** ..... Engineering Technology  
B.S., Wayne State University, 1957; M.A., California State Polytechnic College, 1967. Associate Professor.  
Experience: Assistant training director, Ex-Cello-O Corporation; instructor, technical training department; manufacturing engineer, General Dynamics. Certified manufacturing engineer. Chrysler.
- KEECH, ROGER A. (1965)** ..... Mechanical Engineering  
B.S., California State Polytechnic College, 1955; M.S., University of Southern California, 1964. Professor.  
Experience: Engineer, Menasco Manufacturing Co., Rocky Mt. Arsenal, Lockheed Aircraft; president, Dynalytic Engineering Co.; instructor, California State Polytechnic College, Pomona.
- KEELING, DAVID L. (1975)** ..... Chemistry  
B.S., Arizona State University, 1969; Ph.D., University of Hawaii, 1974. Assistant Professor.  
Experience: Chemist, Shell Chemical Co.; visiting assistant professor, lecturer, assistant professor, University of Hawaii.
- KEEP, ROGER L. (1968)** ..... Industrial Technology  
B.S., Brigham Young University, Hawaii, 1967; M.S., Stout State University, 1968; Ed.D., Utah State University, 1972. Professor.  
Experience: Building construction supervisor, Polynesian Cultural Center, Hawaii; foreman, Perkins Machine Company; licensed general building contractor.
- KEETCH, BRENT H. (1967)** ..... English  
B.A., Utah State University, 1965; M.A., 1966; Ph.D., University of Utah, 1971. Associate Professor.  
Experience: Senior assistant, Utah State University; staff writer, Salt Lake Tribune; correspondent, newsman, Associated Press, Utah, Arizona.
- KEIF, RODNEY G. (1960)** ..... Environmental Engineering  
B.S., Kansas State University, 1949; M.S., Kansas State University, 1975. Professor.  
Experience: Sales and application engineer, O'Connor-Oklahoma Company, Oklahoma City; registered professional engineer, Oklahoma; consultant, Naval Weapons Center, China Lake; private practice.
- KEIL, DAVID J. (1976)** ..... Biological Sciences  
B.S., Arizona State University, 1968; M.S., 1970; Ph.D., Ohio State University, 1973. Assistant Professor.  
Experience: Lecturer, Ohio State University; visiting assistant professor, Grand Valley State Colleges; research assistant, Ohio State University; assistant professor, Franklin College.

- KELLER, ELMO A., JR. (1963)** ..... Computer Science and Statistics  
B.A., Brigham Young University, 1959; M.A., 1961; Ph.D., Iowa State University, 1972. Professor.  
Experience: National Science Foundation trainee, Iowa State University; instructor, Iowa State University; instructor, Church College of Hawaii; graduate teaching assistant, Brigham Young University.
- KELLERMAN, MARTIN (1968)** ..... Chemistry  
B.S., Polytechnic Institute of Brooklyn, 1953; Ph.D., University of Washington, 1966. Associate Professor.  
Experience: Research assistant, Polytechnic Institute of Brooklyn, University of Washington, University of California at San Diego; analytical chemist, Continental Baking Company.
- KELLEY, HELEN P. (1966)** ..... Art  
B.P.A., Brooks Institute of Photography, Santa Barbara, 1966; M.S., California State University, San Jose, 1971. Professor.  
Experience: Family-owned newspaper, Kansas; free-lance photography and writing.
- KENNEDY, EUEL W. (1974)** ..... Mathematics  
B.S., East Central State College, 1962; M.S., University of Utah, 1964; Ph.D., 1972. Associate Professor.  
Experience: Lecturer, San Diego State University; teaching assistant, University of Utah; research assistant and lecturer, University of Alberta; associate professor, Universidad De Simon Bolivar, Caracas, Venezuela.
- KENNELLY, BRUCE (1947)** ..... Chemistry  
B.S., University of Kentucky, 1944; M.S., Purdue University, 1946; Ph.D., Cornell University, 1952. Professor.  
Experience: Chemist, department of agricultural chemistry, Purdue University; research chemist, department of biochemistry and nutrition, Cornell University.
- KENYON, PAUL (1957)** ..... Business Administration  
J.D., Southern Methodist University, 1949; M.A., California State Polytechnic College, 1959. Associate Professor.  
Experience: Insurance legal staff, investment counseling, methods analyst, and business systems and procedures analyst.
- KERBO, HAROLD R. (1977)** ..... Social Sciences  
B.A., University of Oklahoma, 1970; M.A., 1972; Ph.D., Virginia Polytechnic Institute and State University, 1975. Assistant Professor.  
Experience: Assistant professor, Southwestern Oklahoma State University; graduate assistant, Virginia Polytechnic Institute and State University; case worker, Department of Public Welfare, Oklahoma.
- KERR, JOHN F. (1967)** ..... English  
B.A., Arkansas State University, 1953; M.A., University of Michigan, 1956; Ph.D., University of Texas, 1964. Professor.  
Experience: High school journalism and speech teacher, Missouri; assistant professor, Westminster College, Missouri; instructor, University of Missouri; teaching assistant, University of Texas; assistant professor, Louisiana State University.
- KERSTEN, TIMOTHY W. (1971)** ..... Economics  
B.A., Sacramento State College, 1968; M.A., University of Oregon, 1970; Ph.D., 1973. Associate Professor.  
Experience: Radio announcer, KXRZ radio station; survey interviewer, California Department of Water Resources; graduate research assistant, California Coordinating Council for Higher Education.
- KIM, CHI SU (1974)** ..... Library  
B.A., Dan Kook University, Seoul, Korea, 1959; M.A., University of Oregon, 1967; M.L.S., 1969. Associate Librarian.  
Experience: Manager, Committee of Refugees; administrative assistant, Office of Prime Minister, Republic of Korea; librarian, California State University, Humboldt; officer, Republic of Korea Army; graduate assistant, University of Oregon.

- KIMBALL, KENNETH R. (1967)** ..... Industrial Technology  
B.E., University of Southern California, 1956; M.S., 1959; B.S., 1965; Ph.D., Arizona State University, 1976. Professor.  
Experience: Resident engineer and executive officer, Engineer District; member, War Department General Staff; chief of management branch, Major Air Command; air installation officer and wing staff engineer; member of technical staff and supervisor of Electronics Manufacturing, Hughes Aircraft; industrial engineer, chief of overhaul and repair, engineering group leader, Autonetics; manufacturing manager, California Steel and Tube; general manager, Climax Manufacturing; head, plant maintenance, and chief, industrial engineering, Rocketdyne; staff consultant, H. B. Maynard and Company. Registered professional engineer.
- KLIN, KEN E. (1978)** ..... Ornamental Horticulture  
B.S., California Polytechnic State University, 1972.  
Experience: California landscape/irrigation contractor; instructor, Cuesta College.
- KNABLE, ANTHONY E. (1973)** ..... Natural Resources Management  
B.A., Blackburn College, 1965; M.A., Southern Illinois University, 1967; Ph.D., 1972. Associate Professor.  
Experience: Graduate research assistant, graduate teaching assistant, Southern Illinois University; natural resources planner, West Virginia Department of Natural Resources.
- KNECHT, GEORGE N. (1973)** ..... Biological Sciences  
B.S., Rutgers University, 1962; M.S., 1969; Ph.D., University of Arizona, 1975. Associate Professor.  
Experience: Laboratory technician, Rutgers University; research associate, University of Arizona.
- KOBERG, DONALD J. (1962)** ..... Architecture  
B.Arch., Tulane University, 1958; M.Arch., University of Washington, 1970. Professor.  
Experience: Architectural practice as designer and draftsman in Louisiana; instructor, North Dakota State University; lecturer, University of California, Berkeley; research associate, Architectural Prototypes, Berkeley. Registered architect, Louisiana.
- KOGAN, IRVIN J. (1957)** ..... Engineering Technology  
B.A., Wayne University, 1954; M.A., Stanford University, 1955. Additional graduate study, Stanford University. Professor.  
Experience: Instructor, Orange Coast College; U.S. Air Force.
- KOMBRINK, RICHARD T. (1955)** ..... Engineering Technology  
A.B., Loyola University, 1946; B.S.M.E., University of Southern California, 1964. Professor.  
Experience: Pilot, U.S. Army Air Corps; draftsman, Hess, Greiner, and Pollard; sales engineer, T. H. Creears Corp.; civil designer, City of Culver City; assistant project engineer, RCA Radar and Missile Division; consultant, South San Francisco Naval Shipyard. Registered technologist.
- KOURAKIS, JOSEPH M. (1970)** ..... Acting Head, City  
and Regional Planning Department  
B.A. Arch., University of Illinois, 1954; M. Arch., University of Illinois, 1957; M. CRP, University of California, Berkeley, 1961. Professor.  
Experience: Urban design and planning consultant, Berkeley; architect/planner, Whisler Patri, San Francisco; planning officer for physical design, Redevelopment Agency, City of Oakland; senior architectural designer and urban planner, Wilsey, Ham & Blair, San Mateo; assistant planner, Oakland City Planning Department; military installations planner, 12th Naval District; architectural draftsman, Perkins and Will, Architects. Registered architect, California. Member, A.P.A., A.I.C.P.
- KRANZDORF, RICHARD B. (1971)** ..... Political Science  
A.B., University of Pennsylvania, 1958; M.A., 1959; M.A., University of California, Los Angeles, 1970; Ph.D., 1973. Associate Professor.  
Experience: News editor, WBZ-TV, Boston; lecturer, University of Nigeria, Nsukka.

- KREJSA, RICHARD J. (1968)** ..... Biological Sciences  
B.S., Michigan State College, 1954; M.A., University of California, Los Angeles, 1958; Ph.D., University of British Columbia, Vancouver, 1964. Professor.  
Experience: Instructor and assistant professor, Western Washington State College, University of Hawaii, Columbia University.
- KRIEGER, DANIEL E. (1971)** ..... History  
B.A., San Jose State College, 1965; Ph.D., University of California, Davis, 1973. Associate Professor.  
Experience: Associate in history, University of California, Davis; graduate teaching fellow, San Francisco State College.
- KUBINSKI, A. MARK (1975)** ..... Biological Sciences  
B.S., Gonzaga University, 1968; M.S., Washington State University, 1971; Ph.D., 1974. Assistant Professor.  
Experience: Teaching and research assistant, Washington State University; lecturer, California State University, Fresno.
- LABHARD, LEZLIE A. (1967)** ..... Home Economics  
B.S., University of California, Davis, 1965; M.S., 1967. Associate Professor.  
Experience: Laboratory assistant, research assistant, University of California, Davis; consultant, (Subject Matter Specialist), Bureau of Homemaking Education, State Department of Education.
- LAMARINE, STEVEN C. (1969)** ..... Director, Communications/Media Productions  
B.S., Syracuse University, 1966.  
Experience: Production supervisor, Instructional Materials Program; coordinator, Vocational Education Productions.
- LAMBERT, ROYCE L. (1969)** ..... Soil Science  
B.S., Purdue University, 1964; M.S., 1966; Ph.D., 1969. Professor.  
Experience: Farm operator and manager; building products, warehouse manager, graduate teaching assistant and research assistant, Purdue University; consultant and soil conservationist, National Park Service and U.S. Forest Service.
- LAMBERT, WALTER M. (1975)** ..... Off-Campus Housing Coordinator  
B.A. California State University, Long Beach, 1962.  
Experience: Advertising sales and management, Pacific Telephone, Los Angeles; employment counselor and director of operations, Image West, Los Angeles; general manager, Tropicana Village housing, San Luis Obispo.
- LAMOURIA, LLOYD H. (1965)** ..... Agricultural Engineering  
B.S., Michigan State University, 1949; M.S., Iowa State University, 1950. Professor.  
Experience: U.S. Air Force; instructor, Iowa State University; associate professor and associate agricultural engineer, University of California; manager of product planning, J. I. Case Company, Racine, Wisconsin. Registered professional engineer, California.
- LANDRETH, JAMES R. (1956)** ..... Director, Business Affairs  
B.A., Mexico City College, 1954; M.B.A., Stanford University, 1956; additional graduate study, Claremont University College.  
Experience: Instructor, U.S. Army; explosive ordnance disposal, U.S. Army; college personnel officer, assistant to dean of the college, California State Polytechnic College, Kellogg campus; personnel relations and business management analyst, San Luis Obispo.
- LANDWEHR, ALFRED W. (1970)** ..... English  
B.A. University of Missouri, 1963; M.A., 1964; Ph.D., 1970. Professor.  
Experience: Instructor, Northern Arizona University; University of Missouri.
- LANE, BOBBIE A. (1970)** ..... Coach, Physical Education  
B.S., Baylor University, 1963; graduate study, Baylor University, San Diego State College, Central Washington State College.  
Experience: Player, San Diego Chargers football club; physical education instructor and coach, Yakima Valley Community College; head football coach, University of California, San Diego.

- LANG, MARTIN T. (1969) ..... Mathematics  
B.A., North Central College, Naperville, Illinois, 1959; M.A., University of Kansas, 1963, Ph.D., University of Texas at Austin, 1973. Professor.  
Experience: Teaching assistant, University of Kansas; assistant instructor, University of Kansas, University of Texas at Austin; assistant professor, San Diego State College.
- LANGE, JOHN H. (1975) ..... Architecture  
B.S. Arch., University of Cincinnati, 1968; M. Arch., Stanford University, 1972; Ph.D., University of Pennsylvania, 1975. Assistant Professor.  
Experience: Assistant instructor, University of Pennsylvania; designer, Spencer, Lee and Busse, Architects; design draftsman, Skidmore, Owings and Merrill; draftsman, Schenkel and Schultz, Architects and Bradley and Bradley, Architects. Registered architect, California.
- LANGWORTHY, WILLIAM C. (1973) ..... Dean, School of Science and Mathematics  
B.S., Tufts College, 1958; Ph.D., University of California Berkeley, 1961.  
Experience: Chemist, DuPont Company; research chemist, American Cyanamide; assistant professor, Alaska Methodist University; professor, California State College, Fullerton; associate dean, School of Letters, Arts and Sciences, California State College, Fullerton.
- LARSEN, STUART E. (1969) ..... Civil Engineering  
B.S., University of Cincinnati, 1963; M.S., 1965; M.S. Eng., Arizona State University, Tempe, 1969. Associate Professor.  
Experience: Engineering aide, Bell Aerospace Systems, Niagara Falls and Republic Aviation, Farmingdale, New York; test engineer, Hypersonic Aerodynamic Research Group, University of Cincinnati; design engineer, General Electric, Flight Propulsion Division, Evendale, Ohio; consulting engineer, Dynamic Science AVSER, Deer Valley, Arizona; faculty associate, Arizona State University, Tempe.
- LaSALLE, TIMOTHY J. (1974) ..... Poultry Industry  
B.S., California State Polytechnic College, 1970; M.S., Virginia Polytechnic Institute and State University, 1972. Associate Professor.  
Experience: Research assistant, extension specialist, Virginia Polytechnic Institute and State University.
- LASCOLA, RUSSELL A. (1970) ..... Philosophy  
B.A., California State College at Los Angeles, 1962; M.A., University of Southern California, 1964; Ph.D., 1969. Professor.  
Experience: Teaching assistant, University of Southern California; lecturer, Mt. Saint Mary's College; instructor, Glendale College, Los Angeles City College; educational consultant, Educational and Youth Opportunities Agency, Los Angeles.
- LASSANSKE, DANIEL E. (1974) ..... Ornamental Horticulture  
B.S., California Polytechnic State University, San Luis Obispo, 1970; M.S., 1971. Assistant Professor.  
Experience: Vocational Agriculture instructor, Poway, California.
- LAU, JAMES B. (1971) ..... Management  
A.B., Eastern State University, Michigan, 1948; M.A., 1950; Ph.D., University of Michigan, 1954. Professor.  
Experience: Teaching fellow and research assistant, Research Center Group Dynamics, University of Michigan, Detroit Edison Company; chief, Psychological Services, Executive and Organizational Development-C.I.A.; lecturer, George Washington University; professor, and dean, Federal Executive Institute, Charlottesville, Virginia; visiting professor, Graduate School of Business Administration, University of Virginia; officer, U.S. Army.
- LAUMANN, GEORGE C. (1957) ..... Mathematics  
A.B., Chico State College, 1952; M.A., 1953; additional graduate study, University of Oregon, University of California at Los Angeles. Associate Professor.  
Experience: Instructor, Ordnance Department, U.S. Army; teacher California high schools; instructor, Adult Evening College, Chico; participant, National Science Foundation Institute, Portland State College.

- LAZERE, DONALD P. (1977)** ..... English  
B.A., Northwestern University, 1958; M.A., Columbia University, 1964; Ph.D., University of California, Berkeley, 1973.  
Experience: Reporter and editorial assistant, New York Times, New York Post; lecturer, San Jose State University.
- LEE, ROBERT E. (1978)** ..... Electronic and Electrical Engineering  
B.A., University of California, Davis, 1963; M.S., 1966; additional graduate study, Auburn University. Assistant Professor.  
Experience: Lockheed Aircraft Company, Pacific Telephone and Telegraph Company; electronic technician, University of California, Davis; staff engineer, IBM Corporation; teaching assistant, Auburn University; associate professor, Tuskegee Institute; technician training program coordinator, IBM Corporation.
- LEE, THOMAS J. (1952)** ..... Physical Education  
B.A., San Jose State University, 1949; M.A., Stanford University, 1950; M.A., Los Angeles State University, 1971. Professor.  
Experience: Player-coach, All American Professional Basketball Team; instructor, private gymnasium, Oakland; playground director, Hayward Recreation District; swimming instructor, Adult Night School; U.S. Army.
- LEONESIO, ROBERT B. (1972)** ..... Metallurgical Engineering  
B.S., University of Massachusetts, 1963; M.S., Stanford University, 1964; Ph.D., Lehigh University, 1970. Associate Professor.  
Experience: Instrumentation development engineer, Sandia Corporation, Livermore; research and teaching assistant, Lehigh University; assistant professor, Naval Postgraduate School, Monterey.
- LEONG, KINGSTON L. (1970)** ..... Biological Sciences  
B.S., University of Hawaii, 1963; M.S., 1966; Ph.D., Oregon State University, 1970. Associate Professor.  
Experience: Research assistant, University of Hawaii and Oregon State University; termite control advisor, Fumaseal-Honolulu.
- LESCZYNSKI, DAVID B. (1976)** ..... Soil Science  
B.S., Wisconsin State University, Stevens Point, 1967; M.S., University of Wisconsin, Madison, 1969; Ph.D., 1976. Assistant Professor.  
Experience: Soil scientist, U.S. Forest Service; research assistant, University of Wisconsin; soil conservationist, U.S.D.A., Soil Conservation Service; U.S. Army.
- LEVISON, ROBERT L. (1969)** ..... Education  
B.S., Southern Oregon College, 1963; M.Ed., University of Wyoming, 1966; Ed.D., New Mexico State University, 1972. Professor.  
Experience: High school teacher, Central Point, Oregon; high school counselor, McKinleyville, California; counselor, New Mexico State University; psychometrist counselor, La Tuna Federal Prison, Texas.
- LEWIS, GEORGE M. (1967)** ..... Mathematics  
B.A., Stanford University, 1961; M.A., University of Southern California, 1964; Ph.D., 1970. Associate Professor.  
Experience: Instructor, San Fernando Valley State College; assistant teaching, research assistant and instructor, University of Southern California.
- LINDAMOOD, CHARLES H. (1958)** ..... English  
B.A., University of Minnesota, 1949; M.A., Columbia University, 1951; additional graduate study, University of Minnesota, Stanford University, 1957. Associate Professor.  
Experience: Teacher, high school, Salinas; instructor, University of Minnesota, College of Puget Sound, and Taft College, Ft. Ord, Ft. Lewis and McChord Field, Washington.
- LINDVALL, JOHN R. (1973)** ..... Business Administration  
B.A., Whitman College, 1962; M.B.A., Indiana University, 1971; Ph.D., 1973. Professor.  
Experience: Management trainee, People's National Bank; salesman, Moor Business Forms; salesman, Xerox Corporation.

- LINSTRUM, HELEN M. (1970)** ..... Assistant Admissions Officer  
B.A., University of California, Los Angeles, 1961; M.A., California State Polytechnic College, San Luis Obispo, 1970.  
Experience: Elementary school teacher, California; program associate, Office of International Education, Cal Poly, San Luis Obispo.
- LINT, ROBERT G. (1967)** ..... English  
A.B., University of Michigan, 1948; M.A., 1948, 1950; Ph.D., Ohio University, 1967. Professor.  
Experience: High school teacher, Michigan, Washington; instructor, Lower Columbia College; teaching fellow, instructor, assistant professor, Ohio University.
- LIPKE, WILLIAM R., CPT (1978)** ..... Military Science  
B.A., University of Arizona, 1974; M.A., California Polytechnic State University, 1978.  
Experience: Intelligence staff officer, Fort Bragg and Vietnam; instructor, Intelligence School; advisor, Vietnam; commander, adjutant, 3d Armored Cavalry Regiment.
- LITCHFIELD, PETER M. (1970)** ..... Psychology  
B.A., University of Michigan, 1963; M.A., San Diego State College, 1967; Ph.D., University of Portland, 1971. Associate Professor.  
Experience: Part-time English instructor, Centro Cultural-San Jose, Costa Rica; owner, guitar importing firm, Ann Arbor, Michigan; owner, truck firm, Guatemala and Costa Rica; partner, Quality Latin Imports, San Diego; social worker, County of San Diego; laboratory instructor and research assistant, University of Portland.
- LITTLE, H. CLAY (1973)** ..... Agricultural Management  
B.S., University of Missouri, 1950; M.S., 1957; Ph.D., 1965. Associate Professor.  
Experience: Agricultural extension agent, graduate research assistant, University of Missouri; assistant professor, University of Nevada; water resources economist, University of Nevada; U.S. Army.
- LOGAN, ROBERT A. (1977)** ..... Journalism  
B.A., Tulane University, 1969; M.A., University of Missouri, 1973; Ph.D., University of Iowa, 1978. Assistant Professor.  
Experience: News reporter and editor, newspapers in Columbia, Mo., St. Paul, and Iowa City; graduate research and teaching assistant, University of Iowa; research assistant for the National Science Foundation; communications consultant to United Nations Development Project, Accra, Ghana.
- LOH, ALICE C. (1974)** ..... Landscape Architecture  
B. Arch., University of Manitoba, 1966; M.L.A., University of Oregon, 1972. Associate Professor.  
Experience: Assistant professor, North Dakota State University; landscape architect/architect, M. O. Foss, Sr., Architects, Fargo, N.D.; architecture instructor, Northern Alberta Institute of Technology, Edmonton; project architect, Bell, McCullough & Spotowski, Architects, Edmonton; architect coordinator, St. Louis Junior College District.
- LOPER, WILLARD H. (1955)** ..... Agricultural Engineering  
B.S., New York College of Agriculture, Cornell University, 1953. Associate Professor.  
Experience: Dairy and general farming, New York; machinist, Westinghouse Electric Corp., Buffalo; mechanic-welder, New York State College of Agriculture, Cornell University; student assistant instructor, Cornell University; salesman, Holz Co., Ukiah; journeyman welder, draftsman, Cochran Equipment Company, Salinas.
- LOUGHRAN, BERNICE B. (1958)** ..... Art  
B.S., Newark State Teachers College, 1940; M.A., Ohio State University, 1946; Ed.D., Stanford University, 1958. Professor.  
Experience: Elementary school teacher, Southbury, Conn., Santa Barbara and Redwood City; elementary art teacher, Irvington, New Jersey; art instructor, Johnson Teachers College, University of Connecticut and Danbury Teachers College.



- LOWRY, JOHN J. (1962)** ..... Mathematics  
B.S., United States Military Academy, West Point, 1947; M.A., California State Polytechnic College, 1963; M.S., University of Illinois, 1967; Ed.D., Arizona State University, 1974. Professor.  
Experience: Officer and navigation instructor, U.S. Air Force; engineer, Boeing Company.
- LUCAS, NANCY (1977)** ..... English  
B.A., Incarnate Word College, San Antonio, 1964; M.A., University of Illinois, 1966; Ph.D., University of Illinois, 1973.  
Experience: Teaching assistant, University of Illinois; lecturer, Eastern Michigan University.
- LUCAS, ROBERT A. (1975)** ..... Coordinator, Research Development  
A.B., John Carroll University, 1961; M.A., University of Illinois, 1963; Ph.D., 1970.  
Experience: Program representative, Division of Research Development and Administration, University of Michigan; lecturer, assistant professor, University of Michigan; teaching assistant, instructor, University of Illinois; research assistant, University of Illinois and National Council of Teachers of English.
- LUKES, THOMAS M. (1962)** ..... Food Science  
B.S., San Jose State College, 1947; M.S., University of California at Berkeley, 1949. Professor.  
Experience: Microbiologist for Real Gold Citrus Products, Anaheim; laboratory supervisor, Gentry Division of Consolidated Foods, Gilroy.
- LUM HO, BOBBY T., CAPT (1976)** ..... Military Science  
B.B.A., University of Hawaii, 1969; Armor Officers Basic Course, 1969; MATA Course, Defense Language Institute, 1971; Airborne School, Pathfinder School, 1972; Organizational Maintenance Officer's Course, 1974; Armor Officer's Advanced Course, 1974; M.S., University of Southern California, 1976.  
Experience: Platoon leader, executive officer, I Troop 17th Cavalry, Ft. Knox; MAT team leader, assistant operations officer, (MACV) Vietnam; battalion maintenance officer, company commander, (4/63 Armor) 1st Infantry Division, Ft. Riley.
- LUNA, GEORGE W. (1977)** ..... Mathematics  
B.A., University of California, Santa Barbara, 1962; M.A., University of California, Los Angeles, 1965; Ph.D., University of Washington, 1973. Assistant Professor.  
Experience: Instructor, Fort Lewis College; research and teaching assistant, University of Washington; lecturer, California State Polytechnic University, Pomona; visiting mathematician, NOAA Environmental Residence Laboratory; acting assistant professor, University of California, San Diego.
- LUSCHEI, MARTIN L. (1969)** ..... English  
B.A., Nebraska Wesleyan University, 1952; M.F.A., University of Iowa, 1960; Ph.D., University of New Mexico, 1970. Professor.  
Experience: Instructor, U.S. Army, Japan, University of Iowa, University of Texas; assistant cultural affairs officer, U.S. Information Service, Colombia.
- LUTHRA, SHAM S. (1972)** ..... Computer Science and Statistics  
B.A., Panjab University, India, 1952; M.A., 1954; M.S., University of Alberta, Edmonton, Canada, 1969; Ph.D., University of Minnesota, 1974. Associate Professor.  
Experience: Lecturer, Government College, Panjab, India; teaching/research assistant, University of Alberta, Edmonton, Canada; administrative assistant, research assistant, teaching associate, University of Minnesota; instructor, College of St. Thomas, Minnesota.
- LUTRIN, CARL E. (1970)** ..... Political Science  
B.A., Adelphi University, 1962; M.S., University of Wisconsin, 1965; Ph.D., University of Missouri, 1971; additional graduate work, Stanford University. Associate Professor.  
Experience: Instructor, Kellogg Community College; assistant instructor, University of Missouri.

- MAAS, DONALD K. (1976)** ..... Education  
B.A., University of California, Los Angeles, 1966; M.Ed., State University of New York at Buffalo, 1969; Ed.D., 1971. Assistant Professor.  
Experience: Chairman of Reading and Library Science Department, Director of College of Education Reading Clinic, associate professor and assistant professor, University of Guam; Director of E.P.I.S. Tutorial Program, technical specialist and graduate assistant, State University of New York at Buffalo; demonstration teacher, University of California at Los Angeles Psychology Clinic School (Fernald School); secondary and elementary teacher, New York and California.
- MACH, GEORGE R. (1954)** ..... Mathematics  
B.A., Iowa State Teachers College, 1950; M.S., State University of Iowa, 1951; Ph.D., Purdue University, 1963. Professor.  
Experience: National Science Foundation faculty fellow, graduate teaching assistant, Purdue University; visiting professor, National Science Foundation Summer Institute, Washburn University, Kansas; officer, U.S. Navy.
- MADSEN, EUGENE F., M.D. (1974)** ..... Medical Officer  
B.A., University of Rochester, 1949; M.D.C.M., McGill University; Internship, Southern Pacific Hospital, San Francisco, 1957; Residency, Contra Costa County Hospital, 1958; M.P.H., University of Hawaii, 1969.  
Experience: Schering Pharmaceutical Corporation; private practice; Government of Guam; Project HOPE; Department of Public Health, Washington, D.C.; staff physician, University of Massachusetts; president, director, Institute for Venereal Disease Programs, medical director, staff physician, Olmstead Medical and Surgical Group, Rochester, Minnesota.
- MAGER, HANS L. (1949)** ..... Architectural Engineering  
M.S., Royal University of Technology, Stockholm, 1947; Doctorate, Technical University of Vienna, Austria, 1975. Professor.  
Experience: Registered professional engineer, California.
- MAGUR, LEON W. (1958)** ..... Physics  
B.S., California State Polytechnic College, 1958; M.A., University of Northern Colorado, 1971; D.A., 1973. Associate Professor.  
Experience: Teaching and laboratory assistant, University of Northern Colorado; instructor, Aims Junior College, Colorado.
- MAKSOUDIAN, Y. LEON (1963)** ..... Computer Science and Statistics  
B.S., California State Polytechnic College, 1957; M.S., University of Minnesota, 1961; Ph.D., University of Minnesota, 1970. Professor.  
Experience: Instructor, Westmont College, Northwestern College; teaching assistant and instructor, University of Minnesota; junior development engineer, Minneapolis Honeywell Company.
- MALKIN, MICHAEL R. (1974)** ..... Speech Communication  
A.B., Tufts University, 1965; M.A., 1970; Ph.D., 1971. Associate Professor.  
Experience: Sessional lecturer, University of Alberta; associate professor, Indiana University of Pennsylvania; actor.
- MALMBORG, FREDRICK B. (1969)** ..... Mechanical Engineering  
B.S., New York University, 1955; M.S., Columbia University, 1966. Associate Professor.  
Experience: Mathematician, Harvard University; engineer, North American Aviation, Inc., and United Nuclear Corporation, Elmsford, New York; assistant professor, Rochester Institute of Technology.
- MANLEY, WILLIS L., LTC. (1976)** ..... Acting Head, Military Science Department  
Field Artillery Officer's Basic Course, 1957; Associate Battery Officer's Course, 1960; U.S. Army Aviation School, 1961; Instrument Flight Examiner School, 1966; Field Artillery Advance Course, 1970; B.S. Business Administration, Cameron State University, 1971; Command and General Staff College, 1975.  
Experience: Flight Commander, U.S. Army Aviation School; battery commander, Ft. Rucker, Alabama; S1, Infantry Battalion, Aviation Company Commander, 183rd Aviation Company, Vietnam; Artillery Battalion S3 and executive officer, Lance Missile Battalion, First of the Twelfth Field Artillery.

- MARK, WALTER R. (1972)** ..... Natural Resources Management  
B.S., Utah State University, 1968; M.S., Colorado State University, 1970; Ph.D., 1972. Associate Professor.  
Experience: Forest technician, U.S. Forest Service; research associate and research forester, Rocky Mountain Forest and Range Experiment Station; registered professional forester, California.
- MARTINEZ, ANGELINA (1966)** ..... Acting Director, University Library  
B.A., Inter-American University, San German, Puerto Rico, 1943; B.S., Louisiana State University, 1945; M.S., University of Illinois, 1957. Librarian.  
Experience: Assistant librarian, Inter-American University; cataloger Pan-American Union, Organization of American States; head librarian Inter-American Institute of Agricultural Sciences of the Organization of the American States, Costa Rica; head reference librarian, University of California, Davis; director of reader services, Nevada State Library.
- MAUGHAN, SCOTT J. (1965)** ..... History  
B.A., Brigham Young University, 1957; M.A., University of Utah, 1959; Ph.D., 1968. Professor.  
Experience: Instructor, Eastern Montana College, University of Utah.
- MAXWELL, JOHN C. (1978)** ..... Chemistry  
B.S., Whitworth College, 1969; Ph.D., Colorado State University, 1978. Assistant Professor.  
Experience: Medical laboratory specialist, U.S. Army; research assistant, Colorado State University.
- MAYO, EDWARD L. (1968)** ..... History  
B.A., Claremont Men's College, 1959; M.A., 1966; Ph.D., Claremont Graduate School, 1969. Professor.  
Experience: Instructor, Pitzer College, Mt. San Antonio College.
- MCCALEB, DONALD L. (1962)** ..... Acting Director, Public Affairs  
B.S., California State University, Los Angeles, 1958; M.A., California Polytechnic State University, 1970.  
Experience: Public information, U.S. Air Force; representative, office manager, Billy Graham Films; teacher, public relations officer, Maryville Union High School; public relations director, associated students, California State University, Los Angeles.
- MCCOMBS, JOHN W. (1960)** ..... Electronic and Electrical Engineering  
B.S., Clemson University, 1950; B.S., 1957; M.S., 1961; M.A., Northern Arizona University, 1971. Professor.  
Experience: High school teacher, Greenwood, S.C.; instructor, Clemson University; engineer, Greenwood Mills, Lockheed Aircraft Corp., Autonetics, Inc.; officer, U.S. Army Signal Corps.
- MCCORKLE, ROBERT E. (1962)** ..... Agricultural Management  
B.S., California Polytechnic State University, 1960; M.S., University of California, 1962; additional graduate study, Oregon State University, University of Wisconsin. Professor.  
Experience: Farming and ranching; research statistician, Department of Agricultural Economics, University of California; research assistant, Farm Economic Division, Economic Research Service, U.S. Department of Agriculture; chief of party, Cal Poly-A.I.D., Zambia; chief farm management officer, Ministry of Agriculture, Lusaka, Zambia; Director, International Education, California Polytechnic State University.
- McDILL, JEAN M. (1973)** ..... Mathematics  
B.S., University of Texas, 1957; M.S., University of Florida, 1968; Ph.D., 1971. Associate Professor.  
Experience: Assistant engineer, Texas Instruments, Inc.; instructor, San Jose State College; programmer, System Development Corp.; assistant professor, Northern Virginia Community College; lecturer, George Mason University.

- McDONNELL, ROBERT F. (1975)** ..... Head, English Department  
B.A., St. John's University, 1951; M.A., University of Minnesota, 1954; Ph.D., 1958. Professor.  
Experience: Associate professor, Ohio University; professor and chairman of English Department, Western Washington State University.
- McDOUGALL, MICHAEL E. (1972)** ..... City and Regional Planning  
B. Arch., University of Hong Kong, 1955; Master of Regional Planning, Cornell University, 1958. Associate Professor.  
Experience: Assistant architect, Eric Cumine & Associates, Hong Kong; planner/draftsman, John Carl Warnecke & Associates, San Francisco; urban designer/project planner, Wilsey, Ham & Blair, Millbrae, California; principal planner, Ruth & Krushkhov, Berkeley; planner, Leo A. Daly & Company, San Francisco; visiting critic, University of Manitoba, Winnipeg; principal, Michael McDougall & Associates, Richmond.
- McGONAGILL, WILLARD L. (1967)** ..... Architecture  
B.S., Colorado University, 1955; B. Arch., 1956. Associate Professor.  
Experience: Associate, Weaver & Drover, Architects; project manager, Kerr-Beggs, Architectural Engineers; draftsman, Blakey Architects, Langhart Architect; Registered architect, California.
- McINTIRE, ROBERT H. (1977)** ..... Management  
B.S., Oklahoma State University, 1949; M.S., University of Colorado, 1960; Ph.D., University of Washington, 1968. Associate Professor.  
Experience: Design engineer, purchasing, National Lead Company; quality and reliability engineer, procurement and contract administration officer, U.S.A.F.; lecturer, Royal Air Force Staff College and Air Command and Staff College; associate professor, Air Force Institute of Technology and dean of the Civilian Institutions Programs, department head of Systems Management Department; professor, University of Texas of the Permian Basin.
- McINTYRE, LILIANA M. (1977)** ..... Assistant Registrar  
B.A., San Francisco State University, 1969; M.A. California Polytechnic State University, 1973.  
Experience: Teacher, vocational guidance specialist, Monterey County; program director, University of California, Santa Barbara.
- McKIBBIN, CARROLL R. (1974)** ..... Political Science  
B.A., Drake University, 1959; M.A., 1960; Ph.D., University of Kansas, 1967. Professor.  
Experience: Internal Revenue Agent; Foreign Service Officer; instructor, University of Kansas and Drake University; assistant professor, associate professor, Political Science Department chairman, University of Nebraska; Dean School of Business and Social Sciences, California Polytechnic State University.
- McKIM, PATRICK C. (1973)** ..... Social Sciences  
B.A., University of California, Berkeley, 1967; M.A., 1970; Ph.D., 1973. Associate Professor.  
Experience: Acting instructor, NIMH Traineeship; teaching assistant, University of California, Berkeley.
- McKINSTRY, JOHN A. (1968)** ..... Social Sciences  
A.B., University of California, Los Angeles, 1961; A.M., University of Southern California, 1963; Ph.D., 1970. Associate Professor.  
Experience: Teacher, Venice High School; instructor and assistant to dean of men, University of Southern California.
- McLEOD, MALCOLM G. (1973)** ..... Biological Sciences  
B.S., California Polytechnic College, Pomona, 1965; M.A., California State College, Fullerton, 1968; Ph.D., Arizona State University, 1973. Associate Professor.  
Experience: Teaching assistant, lecturer, California Polytechnic State College, Pomona; research assistant, Los Angeles State and County Arboretum; teacher, Anaheim Union High School, South Whittier School; graduate teaching assistant, graduate fellow, Arizona State University.

- McMICHAEL, MELVIN E. (1978)** ..... Head, Management Department  
B.A., Hiram College, 1955; M.B.A., University of Chicago, 1956; Ph.D., University of Texas, 1961; further graduate work Columbia University. Professor.  
Experience: Professor and dean, N.S.W. Institute of Technology, Australia; Professor and director, International Business Center, University of the Americas, Mexico City; visiting professor, University of Edinburgh; lecturer, University of Texas; director, LAPA, Management Consultants, Mexico City; problem analyst, Stanley Works.
- McMORRAN, WAYNE E. (1962)** ..... Electronic and Electrical Engineering  
B.S., California State Polytechnic College, 1960; M.S.E.E., New York University, 1962. Professor.  
Experience: Technician, Western Electric Company, Shell Development Company; member of the technical staff, Bell Telephone Laboratories, Murray Hill, New Jersey; electronics engineer, Lawrence Radiation Laboratory, Livermore, and Jet Propulsion Laboratory, Pasadena.
- McNEAL, LYLE G. (1969)** ..... Animal Science  
B.S., California State Polytechnic College—Kellogg, 1964; M.S., University of Nevada, Reno, 1966; Ph.D., Utah State University, 1978. Associate Professor.  
Experience: Agricultural extension agent, University of Nevada Cooperative Extension Service, Gardnerville; graduate research assistant in animal breeding, University of Nevada; ranching operations in Nevada, Montana, and Utah; assistant manager, Hidden Trails Ranch, Agoura, California; collaborative research associate, U.S. Sheep Experiment Station, Dubois, Idaho; visiting professor, Utah State University; sheep management consultant, U.S. Department of Justice.
- McNEIL, ROBERT J. (1976)** ..... Crop Science  
B.S., Rutgers University, 1967; M.S., 1970; Ph.D., 1975. Assistant Professor.  
Experience: Research assistant, Rutgers University; officer, U.S. Army; tree sprayer and salesman, Ranger, Inc., Point Pleasant Beach, New Jersey; assistant professor, Mercer Community College, New Jersey, Kansas State University.
- McRAE, GLENN G. (1963)** ..... Counselor  
A.B., University of Tampa, 1949; M.Ed., University of Florida, 1954; D.Ed., 1959. Professor.  
Experience: Graduate assistant, fellow, teaching assistant, University of Florida; instructor, St. Petersburg Junior College; visiting summer lecturer, Mississippi State University, Louisiana State University, Northwest Louisiana State College, and State College of Iowa.
- MENG, SHIEN YI (1968)** ..... Electronic and Electrical Engineering  
B.S., Taiwan Provincial Cheng Kung University, 1953; M.S., Oklahoma State University, 1958; Ph.D., Ohio State University, 1968. Associate Professor.  
Experience: Research associate, Ohio State University; research assistant, Cornell University; engineer, Taiwan Provincial Government.
- MENON, UNNY (1978)** ..... Industrial Engineering  
A.P., Sheffield Polytechnic, England, 1969; M.Phil., 1972. Associate Professor.  
Experience: Methods engineer, project leader-O.R., British Steel Corporation; principal officer, research, South Yorkshire County, England; lecturer, senior lecturer, Sheffield Polytechnic; visiting assistant professor, Rochester Institute of Technology; chartered professional engineer, United Kingdom.
- MERIAM, JAMES L. (1972)** ..... Mechanical Engineering  
B.E., Yale University, 1939; M.Engr., 1941; Ph.D., 1942. Professor.  
Experience: Engineer, Pratt and Whitney Aircraft and General Electric Company; U.S. Coast Guard; assistant, associate, and professor, assistant dean of graduate studies, and chairman, Division of Mechanics and Design, University of California, Berkeley; Board of Directors, Engineers' Council for Professional Development; dean, School of Engineering and director, Research and Development, Duke University. Registered professional engineer, California and North Carolina.

- MESLER, FLORENCE (1962)** ..... Nurse Practitioner  
R.N., Patterson General Hospital, New Jersey, 1939. Nurse Practitioner, Brigham Young University, 1974.  
Experience: Industrial nurse, Wright Aero Corporation, Patterson, New Jersey; general duty nurse, Santa Monica Hospital, French Hospital.
- MEYER, THOMAS O. (1955)** ..... Food Science  
B.S., State College of Washington, 1949; M.S., 1953. Professor.  
Experience: Instructor and meats specialist, State College of Washington; assistant animal husbandman, Experiment Station, State College of Washington, Pullman; poultry specialist, Cal Poly A.I.D., Yemen.
- MEYERS, ROBERT E., JR. (1977)** ..... Physical Education  
A.B., Stanford University, 1953; M.S., San Jose State University, 1965; D. Crim., University of California, Berkeley, 1974. Associate professor.  
Professor, Montclair State College; assistant professor, California State University, Los Angeles; project director, Recreation and Youth Services Planning Council, American Justice Institute, California Youth Authority, School of Criminology, University of California, Berkeley; general recreation supervisor, Walnut Creek; director, recreation services, New Haven Unified School District; director, recreation therapy, Ming Quong Home. Registered master therapeutic recreation specialist; lifetime credential, California Community Colleges instructor.
- MILLER, ALLEN D. (1960)** ..... Mathematics  
B.S., Iowa State University, 1945; M.S., 1948; Ph.D., 1953. Professor.  
Experience: High school mathematics teacher, Iowa, Nebraska, Wisconsin, and California; college mathematics teacher, Wisconsin, Illinois, Iowa and California; research development in industry, Hughes Aircraft Company; participant in National Science Foundation institutes, Stanford University, Bowdoin College, University of Arizona, University of Southwest Louisiana, Columbia University.
- MILLER, ERNEST C. (1968)** ..... Management  
B.A., University of Chicago, 1941; M.B.A., 1946; Ph.D., University of Denver, 1954. Associate Professor  
Experience: Supervisor, sales promotion, U.S. Rubber Company; director of personnel, comptroller, O. P. Baur Conf. Corp., Denver; part-time instructor, University of Denver; assistant general manager, Western Reddi-Wip Company; lecturer, University of Alaska and George Washington University; officer, U.S. Air Force.
- MILLER, HAROLD R. (1968)** ..... Financial Manager  
B.S., University of Missouri, 1958; M.S., 1959.  
Experience: Officer, U.S. Air Force; staff accountant, Williams, Keepers, Oliver, Payne & Rackers, CPA's, Columbia, Missouri; comptroller, Ozark Tractor and Implement, Springfield; instructor, Southwest Missouri State College; C.P.A.; assistant professor, Business Administration Department and associate dean, School of Business and Social Sciences, California Polytechnic State University.
- MILLER, PAMELA COOK (1978)** ..... Speech Communication  
B.A., Purdue University, 1968; M.A., 1970; Ph.D., University of Southern California, 1976. Assistant Professor.  
Experience: Chairperson, Speech Communication Department, University of Albuquerque; teacher, University of New Mexico, All Indian Pueblo Council On-Site Teacher Training Program, New Mexico.
- MILLER, STEVEN (1976)** ..... Coach, Physical Education  
B.S., Bradley University, 1966; M.S., California Polytechnic State University, 1978.  
Experience: Teacher, coach, Bloom Township High School, Illinois; editor, publisher, *Timely Times*, Illinois Track and Field News; head track coach, United States Junior Team in Germany, France, England and Holland; pole vault and weight training coach, United States Track and Field Federation tour of Africa; national coach of the year 1978; coach of the West Track Team, United States Sports Festival.

- MISIC, DRAGOSLAV M. (1970)** ..... Environmental Engineering  
Diploma Engineer, University of Ljubljana, Yugoslavia, 1957; M.S., Ph.D., Northwestern University, Evanston, 1963. Associate Professor.  
Experience: Research engineer, Whirlpool Corporation, Benton Harbor, Michigan; research associate, B.A.S.F., Western Germany; postdoctoral fellow, University of California, Davis.
- MOERMAN, KAREN SUE (1969)** ..... Home Economics  
B.S., University of Georgia, 1964; M.S., 1967. Associate Professor.  
Experience: Research technician, Georgia Agricultural Experiment Station; assistant professor, University of Georgia and Georgia Agricultural Experimental Station; visiting professor, Colorado State University; interior design housing consultant.
- MOIR, NEIL J. (1970)** ..... Chemistry  
B.S., Lewis and Clark College, 1962; M.S., University of Oregon Medical School, 1966; Ph.D., 1968. Associate Professor.  
Experience: Graduate teaching instructor, University of Oregon Medical School; post doctoral fellow and research associate, Cornell University.
- MONTEEN, RALPH E. (1978)** ..... Natural Resources Management  
B.S., University of Illinois, 1964; M.S., 1965; M.B.A., University of Denver, 1971; Ph.D., Colorado State University, 1979. Assistant Professor.  
Experience: Industrial and distributor sales, Crown Zellerbach Corporation; instructor, St. Cloud State University, Colorado State University; NSF energy trainee.
- MONTGOMERY, DAVID H. (1956)** ..... Biological Sciences  
B.S., California State Polytechnic College, 1954; M.A., College of the Pacific, 1956; additional graduate study, Friday Harbor Laboratories, University of Washington and University of California. Professor.  
Experience: Laboratory assistant and teaching assistant, California State Polytechnic College; teaching fellow, College of the Pacific; summer faculty, Pacific Marine Biological Station, University of the Pacific; National Science Foundation fellow, Friday Harbor Laboratories and University of California.
- MORIERA, SIXTO EMILIO (1972)** ..... Architecture  
B.S., University of Oklahoma, 1950; M. Arch., 1971; additional graduate study, University of California, Los Angeles. Associate Professor.  
Experience: Designer, Henry Klumb, FAIA, San Juan, Puerto Rico; design consultant, Health Dept., San Juan; contract specialist, U.S. Naval Facilities, San Diego and Puerto Rico; teaching assistant, University of Oklahoma; assistant professor, Idaho State University. Registered architect, Puerto Rico.
- MOREY, KRISHNAKUMAR S. (1970)** ..... Home Economics  
B.S., Nagpur University, India, 1955; M.S., 1958; M.S., U.C. Medical Center, San Francisco, 1963; Ph.D., University of California, Berkeley, 1967. Associate Professor.  
Experience: Research scholar, Nagpur University; teaching assistant, University of California Medical Center; graduate biochemist, teaching assistant, University of California, Berkeley; research associate, Temple University Medical School; participant National Science Foundation Faculty Research Participation Program, A. E. Staley Company; summer research fellow, Sonoma State Hospital, California.
- MORGAN, DONALD E. (1968)** ..... Industrial Engineering  
B.S., Oregon State College, 1940; M.S., Stanford University, 1962; Ph.D., 1963. Professor.  
Experience: Staff technical consultant, ARINC Research Corporation; staff member and partner, Decision Studies Group; professor, Stanford University; manager and partner, Inter-mountain Surgical Supply Company; engineer, Westinghouse Electric Corporation. Registered professional engineer, California.

- MORRIS, DON M. (1957-62) (1969)** ..... Associate Dean, Extended Education  
B.S., M.A., California State Polytechnic College, 1953-1958; Ed.D., University of California Los Angeles, 1968.  
Experience: Resident supervisor-counselor and assistant personnel analyst, California State Polytechnic College; officer and pilot, U.S. Navy; instructor, University of California, Santa Barbara Extension Division; director of adult and summer schools, San Luis Obispo and Simi Valley Unified School Districts; instructor, assistant dean of instruction and coordinator community services, Moorpark College.
- MORRISON, KENT E. (1979)** ..... Mathematics  
B.A., University of California, Santa Cruz, 1971; Ph.D., 1977. Assistant Professor.  
Experience: Community teaching fellow, Santa Cruz public schools; teaching assistant, University of California, Berkeley; lecturer, California State Polytechnic University; assistant professor, Utah State University.
- MOSHER, LYNN S. (1974)** ..... Industrial Technology  
B.S., State University College, Oswego, New York, 1963; M.Ed., St. Lawrence University, 1966; Ed.D., Utah State University, 1972. Associate Professor.  
Experience: Industrial arts teacher, Lisbon Central School, Lisbon, New York; assistant professor, State University College, Oswego, N.Y.; division chairman, Northern Virginia Community College, Alexandria; program review consultant, Accrediting Commission, National Home Study Council.
- MOTT, JOHN H. (1967)** ..... English  
B.A., Southern Oregon College, 1962; M.A., California Polytechnic State University, 1965; Ed.D., University of Northern Colorado, 1970. Professor.  
Experience: Special agent, U.S. Military Forces; art instructor, Boise Junior College; high school English and art teacher, Oregon, California; graduate assistant, Colorado State College.
- MOTT, W. STEPHEN (1972)** ..... Graphic Communications  
B.S., California State Polytechnic College, 1959; M.A., 1973. Associate Professor.  
Experience: Production technician, California State Polytechnic College; lithographer, Commercial Printers, Tucson; ten years additional experience in printing industry.
- MOTTMANN, JOHN (1974)** ..... Physics  
B.A., University of California, Los Angeles, 1966; M.A., 1967; Ph.D., 1972. Associate Professor.  
Experience: Teaching assistant, University of California, Los Angeles; astronomer, National Radio Astronomy Observatory, U.S. Naval Observatory, Aerospace Corp.; instructor, Santa Monica Community College.
- MOY, CARL F. (1968)** ..... Poultry Industry  
B.S., University of Wisconsin, 1967. Associate Professor.  
Experience: U.S. Air Force; research assistant, University of Wisconsin; laboratory supervisor, The Borden Company; cultured products manager, Pensupreme Dairies, Inc.; quality control director, The Borden Company; member, Wisconsin Dairy Technology Society.
- MUELLER, THOMAS J. (1977)** ..... Systems Supervisor, Computer Center  
B.A., Divine Word College, 1957; M.S., DePaul University, 1964; Ph.D., Oregon State University, 1973.  
Experience: Instructor, supervisor of graduate teaching assistants, Oregon State University; chairman, Department of Mathematics, director of athletics, associate editor, San Carlos publications, head basketball coach, University of San Carlos, Philippines; lecturer, Humboldt State University; systems manager, ITT-Federal Electric Corporation.
- MULDER, GEORGE (1968)** ..... Director, Counseling and Testing  
B.A., Long Beach State College, 1956; M.A., 1957; Ph.D., University of Southern California, 1971.  
Experience: Associate dean (Counseling) and counselor, California State Polytechnic College, Kellogg-Voorhis; teacher, Excelsior Union High School District; counselor-instructor, Cerritos College.



- MULLISEN, RONALD S. (1978)** ..... Mechanical Engineering  
B.S.M.E., California Polytechnic State University, 1969; M.Engr., 1976. Assistant Professor.  
Experience: Naval aviator and officer, U.S. Marine Corps; field engineer, Pacific Gas and Electric Company; consultant engineer, Polytechnic Associates Corporation. Registered professional engineer, California.
- MURPHY, PAUL F. (1970)** ..... Mathematics  
A.B., Catholic University of America, 1961; M.A., Brooklyn College, 1966; Ph.D., Michigan State University, 1971. Associate Professor.  
Experience: Graduate assistant, Michigan State University; participant, National Science Foundation Seminar, Bowdoin College.
- MURPHY, NORMAN C. (1976)** ..... Test Officer  
B.G.E., University of Nebraska at Omaha, 1965; M.A., College of Idaho, 1968; Ph.D., University of Washington, 1971.  
Experience: Individual and group counselor, University of Washington; coordinator of guidance services, Plumas Unified School District; rehabilitation psychologist, Tacoma Public Schools, Washington; management analyst and psychologist, Grant Wood Area Education Agency, Cedar Rapids; adjunct professor and doctoral chairman, United States International University, Pacific States University, and Fielding Institute; certified California school psychologist, counselor, social worker; Licensed psychologist, California and Massachusetts psychologist.
- MURRAY, GEORGE T. (1978)** ..... Metallurgical Engineering  
B.S., University of Kentucky, 1949; M.S., University of Tennessee, 1951; Sc.D., Columbia University, 1958. Associate professor.  
Experience: Manager of advanced materials, Materials Research Corporation, New York; metallurgist, Bridgeport Brass Company, Connecticut, Bendix Corporation, Detroit, Oak Ridge National Laboratory.
- MURRAY, RANDALL L. (1977)** ..... Journalism  
B.S., Ohio University, 1960; M.S., 1961; Ph.D., University of Minnesota, 1973. Associate Professor.  
Experience: Information Officer, U.S. Army Signal Center, New Jersey; director of public information and instructor, Morris Harvey College; public relations supervisor and editor, Bell Telephone System; instructor, University of Minnesota; associate professor, Ohio University; managing editor, Journalism Quarterly.
- NAJERA, DANIEL (1971)** ..... Foreign Languages  
B.A., Chilapa Seminary, 1956; graduate study, Graduate School of Theology, Mexico, California Polytechnic State University. Assistant Professor.  
Experience: Administrative trainee, Economic Opportunity Commission; social worker and teacher, Instituto Mexicano del Seguro Social; instructor, Seminario de Acapulco.
- NAKAMURA, ROYDEN (1978)** ..... Biological Sciences  
B.A., University of Hawaii, 1961; M.S., 1965; Ph.D., University of British Columbia, 1970. Assistant Professor.  
Experience: Fisheries technician, U.S. Fish and Wildlife Service, U.S. Department of Interior; research assistant, Hawaii Institute of Marine Biology; director of training program, Lummi Indian Tribal Council; associate professor, Southeastern Massachusetts University.
- NASH, JAMES H. (1978)** ..... Director, Health Services  
B.A., Swarthmore College, 1947; M.D., Stanford University, 1953; Internship, U.S. Naval Hospital, Philadelphia; board certified American Board of Family Practice, 1969, recertified, 1979.  
Experience: Medical officer, U.S. Navy; private practice, Pasadena, King City; assistant clinical professor, family medicine, University of California, Davis; assistant clinical professor, family and community medicine, Stanford University.

- NEEL, PAUL R. (1962) ..... Architecture  
 B.S., California State Polytechnic College, 1958; B. Arch., University of Southern California; 1962; M. Arch., University of Sheffield, 1969. Professor.  
 Experience: Designer-draftsman, W. D. Concolino, A.I.A., Monterey; designer, Quincy Jones, F.A.I.A., Los Angeles; consultant architect to A.I.D. Mission Guatemala; private practice, California; visiting lecturer, University of Sheffield, England. Registered architect, California.
- NEELANDS, JAMES G. (1957) ..Equipment Technician, Physical and Biological Sciences  
 B.S., California State Polytechnic College, 1956; graduate study, University of Washington.  
 Experience: Teaching assistant and research assistant, University of Washington; naval aviator and officer, U.S. Marine Corps.
- NELSON, LAWRENCE H. (1972) ..... Mechanical Engineering  
 B.S., California Institute of Technology, Pasadena; M.S., University of California, Davis, 1971; Ph.D., 1972. Associate Professor.  
 Experience: Engineer, General Electric Co., Sunnyvale; mechanical engineer, U.S. Department of Agriculture, Davis; teaching and research assistant, University of California, Davis; design engineer, Aerojet General Corporation, Sacramento; stress analyst, AiResearch Mfg. Co., Phoenix.
- NELSON, LINDEN L. (1970) ..... Psychology  
 B.A., University of Northern Iowa, 1966; Ph.D., University of California, Los Angeles, 1970. Associate Professor.  
 Experience: Teaching assistant, research assistant, Department of Psychology, University of California, Los Angeles.
- NELSON, RICHARD F. (1960) ..... Biological Sciences  
 B.S., Brigham Young University, 1955; M.S., 1957; Ph.D., State University of Iowa, 1960. Professor.  
 Experience: Teaching assistant, Brigham Young University, State University of Iowa; research associate in radiation biology, State University of Iowa.
- NG, DINA N. (1976) ..... Mathematics  
 B.S., University of San Carlos, Philippines, 1964; M.S., Oregon State University, 1970; Ph.D., 1973. Assistant Professor.  
 Experience: Teacher, Cebu Chinese High School, Philippines; senior instructor, University of San Carlos; teaching assistant, Oregon State University; lecturer, Humboldt State University; visiting professor, Oregon State University.
- NICHOLSON, LOREN L. (1956) ..... Journalism  
 A.B., San Jose State College, 1946; M.B.A., Stanford University, 1947; additional graduate study, Stanford University. Professor.  
 Experience: Advertising sales representative, Watsonville Register-Pajaronian; advertising sales correspondent, Sunset Magazine; advertising director, Redding Record-Searchlight.
- NICKELL, DELL OREY (1965) ..... Acting Head, Architectural Engineering Department  
 B.A., San Jose State College, 1950; M. Engr. Science, Arizona State University, 1974; additional graduate study, Arizona State University. Professor.  
 Experience: Assistant engineer, San Jose Water Works; associate bridge engineer, California State Bridge Department; partner, Gillette-Harris & Associate, Auburn; assistant road commissioner-surveyor, San Luis Obispo County; senior transportation engineer, L.A. Rapid Transit District. Registered civil engineer, California, Colorado, Florida, Kansas, Missouri, Texas, Washington.

- NICOLAIDES, JOHN D. (1975)**..... Head, Aeronautical Engineering Department  
B.A., Lehigh University, 1943; M.S.E., Johns Hopkins University, 1953; Ph.D., Catholic University of America, 1962. Professor.  
Experience: Project manager, General Electric, Schenectady; research scientist, Ballistic Research Laboratories, U.S. Army, Aberdeen Proving Grounds; technical director, Bureau of Ordnance, U.S. Navy; U.S. Navy Space Program, Bureau of Ordnance, and Bureau of Naval Weapons, Washington, D.C.; director of Program Review and Resources Management, and special assistant for space sciences and applications, NASA; chairman, Department of Aerospace Engineering, University of Notre Dame; president, A-E-R-O, South Bend, Indiana; Officer U.S. Navy.
- NIELSEN, KEITH E. (1959)**..... Speech Communication  
B.A., Alma College, 1953; M.A., Stanford University, 1959; M.A.Ed., California State Polytechnic College, San Luis Obispo, 1966; Ph.D., Michigan State University, 1970. Professor.  
Experience: Graduate assistant, Michigan State University; communication consultant, California Department of Education and Agency for International Development; secondary teacher, State of Michigan.
- NILES, PHILIP W.B. (1967)**..... Environmental Engineering  
B.S., University of California, 1957; M.S., 1958; additional graduate study, University of California, Los Angeles. Professor.  
Experience: Consultant, Rand Corporation; teaching assistant and post-graduate research engineer, University of California, Los Angeles; senior research engineer, Rocketdyne.
- NIU, SHIEN HWEI (1969)**..... Library  
B.A., National Taiwan University, 1951; M.A., Bucknell University, 1957; additional graduate study, University of Wisconsin; M.A. L.S., Indiana University, 1967. Senior Assistant Librarian.  
Experience: Assistant catalog librarian, Drake University Library.
- NOBLE, WILLIAM E. (1973)**..... Ornamental Horticulture  
B.S., University of Maryland, 1964; M.S., 1969; Ph.D., University of Florida, 1974. Associate Professor.  
Experience: Graduate research assistant, University of Maryland; horticulturalist, Woodside Gardens, Inc., Rockville, Maryland; graduate teaching assistant, University of Florida.
- NOBLE, MICHAEL S. (1979)**..... Business Administration  
B.A., University of Arizona, 1967; M.B.A., 1973; D.B.A., Arizona State University, 1978, Associate Professor  
Experience: Manager of planning, Bendix Corporation.
- NORDQUIST, RAYMOND E. (1964)**..... Architecture  
B.S., Arch., Montana State College, 1950; M. Arch., University of California, Berkeley, 1971. Professor.  
Experience: Private architectural practice; principal partner, Nordquist & Sundell, Architects; chief designer, Cushing & Terrell; designer and draftsman for architects and building contractors in Montana and Washington; U.S. Army Air Corps. Registered architect, Montana, Wyoming and California.
- NOSHY, AMEEN I. (1969)**..... Architecture  
B. Arch., Cairo University, 1963; M.S. Arch., Illinois Institute of Technology, Chicago, 1969; additional graduate work, University of Strathclyde. Associate Professor.  
Experience: Draftsman in architectural firms in Cairo and West Berlin; designer and field supervisor in Development and Popular Housing Corp., Cairo; instructor at Al-Azhar University, Cairo; designer, Cairo, P. L. Nervi, Rome and C. F. Murphy, Assoc., Chicago.
- NOYES, O. ROBERT (1974)**..... Food Science  
B.A., Norwich University, 1963; M.Ed., University of Georgia, 1970; Ph.D., 1974. Associate Professor.  
Experience: Science teacher, Hardwick Academy, Vermont; Fellow, NSF Academic Year Institute, Biology Department, University of Georgia; teaching and research assistant, University of Georgia.

- NULMAN, DENNIS M. (1977)** ..... Education  
B.A., University of San Diego, 1970; M.E.D., 1972; Ph.D., University of Southern California, 1977. Assistant Professor.  
Experience: Teacher/executive director, Atwater Park Center; ECE coordinator, Huntington Beach City Elementary School District
- NUTTER, DAVID E. (1974)** ..... Accounting  
A.B., West Virginia University, 1954; M.B.A., Indiana University, 1958; D.B.A., University of Southern California, 1974. Professor.  
Experience: Audit and personnel manager, Peat, Marwick, Mitchell & Co.; assistant professor, University of Hawaii; instructor, University of Southern California; C.P.A. Indiana.
- NYE, MARLENE (1975)** ..... Senior Clinical Laboratory Technologist  
B.S., California Polytechnic State University, San Luis Obispo, 1967.  
Experience: Sierra Vista Hospital, San Luis Obispo; San Luis Medical Clinic, Pismo Beach and San Luis Obispo.
- OCHYLSKI, MARSHALL E. (1978)** ..... Ornamental Horticulture  
B.A., University of Michigan, 1970; M.L.A., 1973. Assistant Professor.  
Experience: Research assistant and teaching fellow, University of Michigan; landscape architect/land planner, Gary J. Corser, Kansas; assistant professor, Purdue University.
- O'CONNOR, EUGENE L. (1964)** ..... Business Administration  
B.S., St. Louis University, 1957; M.S., 1963. Associate Professor.  
Experience: President, Western Data Management, San Luis Obispo.
- OELSCHIG, FREDERICK H. (1976)** ..... Ornamental Horticulture  
B.S., University of Georgia, 1972; M.S., North Carolina State University, 1976. Assistant Professor.  
Experience: Grower, greenhouse manager, foreman, Oelschig's Nursery, Inc., Savannah; U.S. Army; graduate research assistant, North Carolina State University.
- OFFERMANN, GENE P. (1970)** ..... Crop Science  
B.S., Southern Illinois University, 1964; M.S., 1965; Ph.D., University of California, Davis, 1970. Associate Professor.  
Experience: Research assistant, Southern Illinois University and University of California, Davis; general farming.
- O'LEARY, MICHAEL J. (1951)** ..... Social Sciences  
A.B., San Francisco State College, 1950; M.A., Stanford University, 1951; additional graduate study, Stanford University, University of Oregon. Professor.  
Experience: Property accountant, U.S. Marine Corps Supply Depot; instructor and examiner-specialist, Air Force Radar Technical School; instructor, U.S. Armed Forces Institute.
- OLIVER, WILLIAM A. (1978)** ..... Engineering Technology  
B.S., California Polytechnic State University, 1966; additional graduate studies University of California, Berkeley. Associate Professor.  
Experience: Welding engineer, Westinghouse Electric Corporation; owner M & O Products; welder, Mare Island Naval Shipyard.
- OLSEN, BARTON C. (1968)** ..... History  
B.A., University of Utah, 1955; M.A., 1966; Ph.D., 1968. Professor.  
Experience: Teacher, South High School, Salt Lake City; principal, Cardston School District, Cardston, Alberta.
- O'NEIL, THOMAS D. (1973)** ..... Mathematics  
B.A., San Diego State College, 1966; M.A., 1968; Ph.D., University of Wyoming, 1969. Associate Professor.  
Experience: Electronic development technician, General Dynamics/Astronautics; electronic research engineer, The Boeing Company; teaching assistant, San Diego State College, University of Wyoming; instructor, University of Wyoming; instructor, U.S. Navy.

- O'NEILL, GERTRUDIS M. (1972)** .....Library  
 B.A., Inter-American University, Puerto Rico, 1955; M.F.A., University of Cincinnati, 1962; M.L.S., Western Michigan University, 1967; additional graduate study, Art Academy of Cincinnati. Assistant Librarian.  
 Experience: Graduate assistant, Western Michigan University; reference librarian, Public Library of Cincinnati and Hamilton County.
- ORLICK, STEVEN C. (1972)** ..... City and Regional Planning  
 B.A., University of California, Santa Barbara, 1969; M. Urban Planning, University of Washington, 1971; Ph.D., 1975. Associate Professor.  
 Experience: Junior consulting assistant, Resources, Applications, Designs and Controls, Inc., Los Angeles; teaching assistant, research assistant, research associate, Urban Transportation Research and Training Program, University of Washington; assistant graduate program advisor, University of Washington.
- ORR-CAHALL, CHRISTINA (1978)** ..... Art  
 B.A., Mount Holyoke College, 1965; M.A., Yale University, 1974; M.Phil., 1975; Ph.D., 1979. Assistant Professor  
 Experience: Head teaching assistant, Yale University; curator of collections, Norton Gallery of Art, Florida; consultant curator, Department of History, Oakland Museum.
- ORTH, MICHAEL P. (1967-69) (1970)** .....English  
 B.A., University of California, Santa Barbara, 1959; M.A., San Francisco State University, 1963; Ph.D., Claremont Graduate School, 1974. Associate Professor.  
 Experience: Officer, U.S. Army; teaching assistant, University of New Mexico; instructor, Chico State College.
- ORTIZ, MARIA E. (1972)** ..... Biological Sciences  
 B.S., Southwest Texas State University, 1968; M.A., 1970; Ph.D., Texas Women's University, 1973. Associate Professor.  
 Experience: Laboratory instructor, Southwest Texas State University; laboratory instructor and research assistant, Texas Woman's University.
- OSBALDESTON, ROGER (1972)** ..... Landscape Architecture  
 Diploma in Architecture, School of Architecture, Nottingham, England, 1957; M.L.A., University of Pennsylvania, 1961. Associate Professor.  
 Experience: Architectural assistant, Michael Moss, Architect, Nottingham; landscape designer, Lawrence Halprin and Associates; landscape designer, Dan Kiley and Partners; landscape designer, Cornell, Howland, Hayes and Merryfield; visiting lecturer, University of Oregon. Registered landscape architect, Washington, Oregon.
- OSTEYEE, LEON F. (1957)** ..... Mechanical Engineering  
 B.M.E., Rensselaer Polytechnic Institute, 1945; M.M.E., 1957; additional graduate study, Massachusetts Institute of Technology. Professor.  
 Experience: Instructor, Rensselaer Polytechnic Institute; designer, General Electric Company, American Locomotive Co.; ship superintendent, U.S. Naval Shipyard, Bremerton, Washington. Registered professional engineer, California and New York.
- O'TOOLE, FREDERICK J. (1972)** ..... Philosophy  
 B.A., University of California, Los Angeles, 1966; M.A., University of California, Davis, 1968; Ph.D., 1972. Associate Professor.  
 Experience: Lecturer, California State College, Hayward; associate in philosophy, University of California, Davis; teaching assistant, University of California, Davis and Los Angeles.
- OZAWA, KENNETH S. (1963)** ..... Physics  
 B.S., John Carroll University, 1959; M.S., 1960; Ph.D., University of Kansas, Lawrence, 1975. Professor.  
 Experience: Graduate assistant and instructor, John Carroll University; resident director, CSUC International Program, Japan; visiting professor, Waseda University, Japan.
- PAGE, PERRYMAN L. (1963)** .....Library  
 B.A., University of Mississippi; M.S.L.S., Louisiana State University, 1963. Associate Librarian.  
 Experience: U.S. Air Force.

- PAPAKYRIAZIS, PANAGIOTIS A. (1971)** ..... Economics  
B.A., Athens School of Economics and Business Science, 1964; Ph.D., University of California, San Diego, 1974. Associate Professor.  
Experience: Cost analyst, Marinopoulos Pharmaceutical Corporation, Greece; research assistant, Center of Planning and Economic Research, Board of Experts, Greece; teaching and research assistant, University of California, San Diego.
- PARKER, LEE R. (1974)** ..... Biological Sciences  
B.S., Brigham Young University, 1966; M.S., 1968; Ph.D., Michigan State University, 1976. Associate Professor.  
Experience: Teaching assistant, Brigham Young University; range analyst, U.S. Forest Service, Provo, Utah; visiting associate professor, University of Oregon; instructor, Michigan State University.
- PATTERSON, KATHRYN P. (1960)** .. Acting Procurement and Support Services Officer  
Graduate, Calhoun Business College, 1939  
Experience: Procurement Assistant, Purchasing Office, California Polytechnic State University.
- PAUL, GORDON J. (1969)** ..... Accounting  
B.S., Montana State College, 1957; M.B.A., University of New Mexico, 1966. Assistant Professor.  
Experience: Controller and treasurer, The Dikewood Corporation, Albuquerque; manager, financial accounting, ACF Industries, Inc., Albuquerque; tax accountant, Caterpillar Tractor Company, Peoria, Illinois.
- PAUTZ, ROLAND K. (1959)** ..... Dairy and Poultry Science  
B.S., Oregon State College, 1957; M.S., Oregon State University, 1968. Professor.  
Experience: Research assistant, Oregon State College.
- PELLATON, EVELYN I. (1966)** ..... Physical Education  
B.A., San Francisco State College, 1950; M.A., 1953. Professor.  
Experience: Director, Oakland Recreation Department; official and gym supervisor, San Francisco Recreation Department; summer camp counselor; WAVE athletic officer, Special Services, U.S. Navy; instructor, Marin Catholic High School, Portola Junior High School; dean-counselor, Portola Junior High School, Downey Junior High School.
- PENA, S. REY (1972)** ..... Administrative Assistant, Business Affairs  
B.A., California State University, Fresno, 1966; M.A., California Polytechnic State University, 1975.  
Experience: Management analyst, State of California Franchise Tax Board; director of training and placement, Production Training Corporation, Fresno; educational consultant and marketing specialist, Silver Burdett Company, Palo Alto.
- PENDSE, PRATAPSIHA C. (1966)** ..... Biological Sciences  
B.S., Bombay University, 1947; M.S., Poona University, 1951; M.S., Utah State University, 1959; Ph.D., 1965; additional graduate study, Stanford University, Yale University, McGill University, Johns Hopkins University, School of Medicine. Professor.  
Experience: Lecturer, Bombay and Poona Universities; teaching and research assistant, Utah State University; assistant professor, Colgate University.
- PERELLO, DOMINIC B. (1954)** ..... Economics  
A.B., University of California, Santa Barbara College, 1951; M.S., University of Wisconsin, 1952; additional graduate study, University of California, Los Angeles. Professor.  
Experience: Officer, U.S. Air Force; partner, Perello and Sons; teaching assistant, University of California, Los Angeles.
- PEREZ, MARINA E. (1975)** ..... Nurse Practitioner  
B.S., University of the Philippines, 1961.  
Experience: Staff nurse, Jefferson Medical College Hospital Pennsylvania; clinical instructor, medical surgical nursing, Mary Chiles General Hospital School of Nursing; staff nurse, ICCU and medical floor, Harkness Community Hospital, San Francisco; staff nurse and relief supervisor, ICCU, Sierra Vista Hospital.

- PERLICK, WALTER W. (1979)** ..... Head, Business Administration Department  
B.S., M.S., Northern Illinois University, 1965; Ph.D., Pennsylvania State University, 1973.  
Professor.  
Experience: Associate and assistant professor, Colorado State University; graduate assistant, Pennsylvania State University; instructor and graduate assistant, Northern Illinois University; manager, Drews Department Store, Chicago.
- PERRYMAN, ELIZABETH K. (1972)** ..... Biological Sciences  
B.S., Memphis State University, 1964; M.S., Texas Technological College, 1967; Ph.D., University of Arizona, 1972. Associate Professor.  
Experience: Teacher, West Memphis High School; teaching assistant, Texas Tech University; instructor, Victoria College, Texas.
- PETERS, JAMES M. (1958-60) (1963)** ..... Chemistry  
A.B., University of California, 1953; Ph.D., 1957. Professor.  
Experience: Biochemist, University of California; instructor, California State Polytechnic College; biochemist, Baltimore City Hospitals; assistant professor, University of Maryland.
- PETERS, RALPH A. (1969)** ..... Physics  
B.S., Georgetown University, 1949; M.S., Pennsylvania State University, 1951; Ph.D., Fordham University, 1967. Professor.  
Experience: Assistant professor, Lewis College; instructor, Michigan State University; assistant professor, Fordham University; associate professor, University of the Pacific.
- PETERSON, JAMES J. (1964)** ..... English  
B.A., Bradley University, 1952; M.A., University of Pennsylvania, 1956; additional graduate study, Temple University, University of Pennsylvania. Associate Professor.  
Experience: Assistant instructor, University of Pennsylvania; substitute teacher, Philadelphia Public Schools; high school instructor, Bryn Mawr, Pennsylvania; instructor, Susquehanna University, New York State University.
- PEZO-SILVA, ARMANDO A. (1973)** ..... Associate Director, Educational Opportunity Program  
B.S., California Polytechnic State University, 1970; M.A., 1974; M.S., 1979.  
Experience: Law clerk, California Rural Legal Assistance; consultant, Santa Barbara County Affirmative Action; consultant for bilingual education, Preschool and Community Development, Health Education and Welfare.
- PHAKLIDES, WILLIAM J. (1963)** ..... Engineering Technology  
B.S., California State Polytechnic College, 1956; graduate study, Montana State University. Professor.  
Experience: U.S. Army and U.S. Navy; design engineer, Baker-Newman Co., Inc., and Barium Products, Ltd., Modesto; Conditioned Air, Fresno; consultant, U.S. Naval Weapons Center, China Lake. Registered professional engineer, California.
- PHILLIPS, DENNIS R. (1976)** ..... Chemistry  
B.A., Whitman College Washington, 1971; Ph.D., University of Hawaii, 1976. Assistant Professor.  
Experience: Graduate research and teaching assistant, University of Hawaii.
- PHILLIPS, JOHN C. (1974)** ..... Crop Science  
B.S., Washington State University, 1967; M.S., Colorado State University, 1969; Ph.D., Oregon State University, 1974. Associate Professor.  
Experience: Research assistant, Department of Agronomy, Colorado State University; laboratory assistant, U.S. Army Biological Defense Research Center; research assistant, Department of Agronomic Crop Science, Oregon State University.
- PHILLIPS, PETER K. (1968)** ..... Facilities Planner  
B.S., California State Polytechnic College, 1959.  
Experience: Designer-draftsman, John R. Ross and Associates, Inc., San Luis Obispo and Arendt/Mosher/Grant, Architects, Santa Barbara; private practice. Registered architect, California; A.I.A.

- PHILLIPS, WILLIAM R. (1957)** ..... Architectural Engineering  
B.Arch., University of Southern California, 1952; M.Arch., University of Hawaii, 1971.  
Professor.  
Experience: Designer, W. H. Harrison, Architect; designer and engineer, U.S. Engineer Department; engineer, North American Aviation, Inc.; fallout shelter analysis, Office of Civil Defense, Dept. of Army; private architectural practice in California. Registered architect, California.
- PILLSBURY, NORMAN H. (1974)** ..... Natural Resources Management  
B.S., Humboldt State University, 1968; M.S., 1972; Ph.D., Colorado State University, 1976.  
Associate Professor.  
Experience: Instructor, Humboldt State University, Jamestown Community College, Colorado State University; research forester, watershed research, U.S. Forest Service. Registered professional forester, California.
- PIMENTEL, RICHARD A. (1952)** ..... Biological Sciences  
A.B., San Jose State College, 1947; M.S., Oregon State College, 1950; Ph.D., 1952. Professor.  
Experience: Officer, U.S. Army; teaching assistant, Oregon State College; ranger-naturalist, Crater Lake National Park; associate professor, University of California Extension Nature Study Institute at Santa Barbara; lecturer, National Science Foundation Science Program.
- PINARD, LEO W., II (1970)** ..... Social Sciences  
B.A., University of Santa Clara, 1962; M.A., University of Notre Dame, 1963; Ph.D., 1971.  
Associate Professor.  
Experience: Teaching assistant, University of Notre Dame; lecturer, Immaculate Heart College; fertility research, USAID, Philippines.
- PIPER, CURTIS DEAN (1964)** ..... Head, Soil Science Department  
B.A., W. J. Bryan University, 1953; M.S., Michigan State University, 1959; Ph.D., 1967.  
Professor.  
Experience: Farm operator; food service director, Kings College; instructor in research and teaching, Michigan State University; coordinator of agricultural Peace Corps training programs, Niger, Chad, and Morocco, Africa, Rajasthan, India, and Thailand; director of in-country training program Jaipur, Rajasthan, India 1968; consultant, Morocco Peace Corps; consultant, in-country Morocco Peace Corps.
- PIPPIN, LOUIS D. (1970)** ..... Education  
B.S., West Texas State College, 1952; M.Ed., 1956; Ed.D., North Texas State University, 1970.  
Associate Professor.  
Experience: Teacher, Baird, Happy and Amarillo, Texas; counselor, Amarillo High School; visiting professor, North Texas State University; U.S. Army.
- PITTMAN, NANCY A. (1972)** ..... Counselor, Financial Aid  
B.S., University of Wisconsin, La Crosse, 1968; M.S., California Polytechnic State University, 1974; M.A., 1975.  
Experience: Teacher, Central Junior High School, Riverside; student personnel technician, California Polytechnic State University.
- POHL, JENS G. (1973)** ..... Architecture  
B. Arch., University of Melbourne, Australia, 1964; M. Building Science, University of Sydney, Australia, 1967; Ph.D., 1970. Professor.  
Experience: Private practice and consultant, Sydney; senior lecturer, University of New South Wales, Australia; post-graduate tutor, Department of Education and Science, Commonwealth of Australia; demonstrator, University of Sydney; architect, Public Works Department of Victoria Australia. Registered architect, Vic. and N.S.W., Australia, F.R.A.I.A., A.I.C.
- POLING, JOHN E. (1976)** ..... Physics  
B.A., University of Chicago, 1965; M.S., University of Iowa, 1969; Ph.D., 1975. Assistant Professor.  
Experience: Teacher, Kirkwood Community College, Iowa; teaching and research assistant, University of Iowa.



- POLK, BENJAMIN K. (1966)** ..... Architecture  
Diploma, School of Planning and Research in Regional Development, England, 1952. Associate Professor.  
Experience: Private practice in architecture and planning, 1948–1965. Registered architect, California; NCARB registration.
- POPKIN, DOROTHY R. (1978)** ..... Counselor  
B.S., Adelphi University, 1959; M.S., 1969; Ph.D., Union Graduate School, Ohio, 1979.  
Experience: Associate professor, State University of New York, Stony Brook; Tel Aviv University, Israel; senior lecturer, University of Maryland; Certification in Group Psychotherapy, Washington School of Psychiatry, 1970; Certificate, Family Systems Therapy, Georgetown University Family Center, 1976.
- PRICE, D. JOHN (1957)** ..... Mechanical Engineering  
National Certificate in M.E., Dudley and Staffordshire Technical College, 1950; B.S., California State Polytechnic College, 1954. Associate Professor.  
Experience: Engineer, British Electricity Authority; assistant planning engineer, British Columbia Telephone Co.; technical assistant, Vickers Armstrong Ltd.; officer, RCAF.
- PRITCHARD, EILEEN ELLEN (1973)** ..... Library  
B.A., California State University, Chico, 1961; Ph.D., University of Kansas, 1967; M.L., Kansas State Teachers College, 1972. Senior Assistant Librarian.  
Experience: Graduate assistant, University of Kansas; trainee, national Institutes of Health, University of Kansas; assistant professor, Northern Arizona University.
- PROCTOR, ANDREW J. (1973)** ..... Physical Education  
B.S., California Polytechnic State University, 1970; M.S., 1971; Ph.D., University of Utah, 1978. Assistant Professor.  
Experience: Graduate teaching assistant, California Polytechnic State University; graduate teaching assistant, University of Utah; officer, U.S. Army.
- PUNCHES, GERALD N. (1971)** ..... Registrar  
B.A., Western Washington State College, 1970; M.Ed., 1971; additional graduate study, University of California, Santa Barbara.  
Experience: Teacher, public schools, Bellingham, Washington; U.S. Navy.
- QUINLAN, CHARLES W. (1966)** ..... Architecture  
B.Arch., Cornell University, 1959; M.A., University of Sheffield, 1974. Professor.  
Experience: Private practice, urban planning and architecture; instructor, University of New Mexico. Registered architect, California; NCARB certified.
- RABE, PETER (1967)** ..... Psychology  
B.A., Ohio State University, 1943; M.A., Western Reserve University, 1948; Ph.D., 1949. Associate Professor.  
Experience: Self-employed psychological counseling, therapy, writer; research fellow, Jackson Laboratory, Bar Harbor, Maine; lecturer, Western Reserve University.
- RADEMAKER, PIERRE (1972)** ..... Art  
B.A., California State College, Long Beach, 1970; M.F.A., Syracuse University, New York, 1978. Associate Professor.  
Experience: Art director and production manager, The Sunshine Studio; assistant art director, Martin Advertising and Public Relations; graphic specialist, County of Los Angeles Parks and Recreation Department and City of Lawndale; free-lance publication designer, graphic designer, and illustrator.
- RAILEY, JIMMY H. (1977)** ..... Head, Physical Education Department  
B.S., Murray State University, 1959; M.S., Indiana University, 1959; D.P.E., 1969. Professor.  
Experience: Chairman, Health, Physical Education and Recreation, director of athletics, Georgetown College, chairman, Physical Education, Marshall University; associate professor, Weber State College; head coach, head athletic trainer, Utah State University; assistant coach, athletic trainer, Arizona State University; high school coach, Bridgeport, Illinois.

- RALSTON, DAVID W. (1976)** ..... Medical Officer  
B.A., University of California, Irvine; B.S., 1969; M.D., University of Southern California, 1973; Diplomate American Board of Internal Medicine, 1976.  
Experience: Internship, Los Angeles County-University of Southern California Medical Center; internal medicine residency, Emanuel Hospital, Portland, Oregon.
- RANDAZZO, ANTHONY JAMES (1977)** ..... Industrial Technology  
B.A., San Jose State College, 1965; M.A., 1968; Ph.D., Washington State University, 1976. Assistant Professor.  
Experience: Printer, International Business Machines Corporation; industrial education teacher, San Jose.
- RATCLIFFE, RONALD V. (1963)** ..... Music  
B.A., University of Washington, 1956; M.M., University of Southern California, 1958. Professor.  
Experience: Piano teacher; assistant professor, College of the Ozarks; music director, Music-Go-Round Theater; consultant, Open University and BBC Television, England; performing artist, harpsichord and piano.
- RATHBUN, LARRY P. (1970)** ..... Head, Agricultural Education Department  
B.S., California Polytechnic State University, San Luis Obispo, 1964; M.A., 1967; Ph.D., Ohio State University, 1974. Associate Professor.  
Experience: Director of agriculture, Rio Vista High School; director of agriculture, coordinator of vocational education, coordinator of Manpower Development Act, Los Banos High School; evening instructor, Modesto Junior College and Merced College.
- REED, JAMES W. (1975)** ..... Speech Communication  
B.A., Pasadena College, 1968; M.A., Southern Illinois University, 1970; Ph.D., 1972. Assistant Professor.  
Experience: Chairman, Division of Language Arts, University of Guam; instructor, Southern Illinois University.
- REESE, JEANETTE M. (1976)** ..... Health Educator  
B.A., University of California, Santa Barbara, 1975.  
Experience: Member, State Office of Family Planning Advisory Board, San Luis Obispo County Family Planning Services Coordinating Council, E.O.C. Family Planning Advisory Board; education coordinator, E.O.C. Family Planning, San Luis Obispo; patient educator, private physician's office, San Luis Obispo; resident assistant, University of California, Santa Barbara.
- REGAN, RONALD D. (1977)** ..... Head, Ornamental Horticulture Department  
B.S., California State Polytechnic College, 1951; M.A., Los Angeles State College, 1959; additional graduate study, University of Southern California. Professor.  
Experience: Officer, U.S. Air Force; research director, Monrovia Nursery Company; instructor, Venice High School; director of agriculture, Cleveland High School; consultant and supervisor, Los Angeles Unified School District; nursery owner.
- REIF, GARY D. (1967)** ..... Poultry Industry  
B.S., Kansas State University, 1962; M.S., University of Nebraska, 1964; Ph.D., Iowa State University, 1967. Professor.  
Experience: Research assistant, University of Nebraska; research and teaching assistantship, director of dairy and food products analysis laboratory, Iowa State University.
- REYNOLDS, GERALD D. (1969)** ..... Counselor, Financial Aid  
B.S., California State Polytechnic College, 1963; M.A. 1970.  
Experience: Manufacturers representative, Mead-Johnson Nutritionals; territory sales representative, Home Garden Division, Ferry-Morse Seed Company; company representative, Canned Milk Division, Carnation Company; student affairs internship, California State Polytechnic College; training officer, U.S. Coast Guard Reserve.

- REYNOLDS, ROBERT G. (1963)** ..... Art  
B.P.A., Art Center College of Design, Los Angeles, 1962; M.A., California Polytechnic State University, San Luis Obispo, 1970. Professor.  
Experience: Artist, Creative Arts Studio, San Luis Obispo; free-lance illustrator-painter, Los Angeles and San Luis Obispo; art instructor, San Luis Obispo Adult School and Cuesta College; staff artist, production coordinator, instructor, California Polytechnic State University; regional artist, Ford Times magazine.
- RHOADS, HOWARD (1956)** ..... Crop Science  
B.S., Montana State University, 1951; M.S., 1952. Professor.  
Experience: Fieldman, Great Western Sugar Co., Billings, Montana; instructor and assistant, Montana State University.
- RICE, ROBERT P. (1976)** ..... Ornamental Horticulture  
B.S.A., University of Georgia, 1973; M.S., 1974; Ph.D. Michigan State University, 1977. Assistant Professor.  
Experience: Garden center manager; vegetation control engineer, N & W R.R.; research technician, Scientific Research Corporation; continuing education instructor, teaching and research assistant, Michigan State University; manager, Spartan Community Gardens; commercial vegetable production.
- RICE, WALTER E. (1964)** ..... Economics  
B.A., San Francisco State College, 1960; M.A., 1963; M.A., Claremont Graduate School, 1970; Ph.D., 1973. Professor.  
Experience: Assistant floor manager, Roos/Atkins; student teacher, College of San Mateo; tutor, San Francisco; instructor, California State Polytechnic College, Kellogg-Voorhis.
- RICHARDS, THOMAS L. (1969)** ..... Biological Sciences  
B.S., California State College, Long Beach, 1964; M.A., 1966; Ph.D., University of Maine, 1969. Professor.  
Experience: Technical and research assistant, California State College, Long Beach; research assistant, NDEA fellow, Ira C. Darling Marine Laboratory, Walpole, Maine.
- RICKARD, HERMAN E. (1959-68) (1969)** ..... Poultry Industry  
B.S., Ohio State University, 1950; M.S., 1954; Ph.D., 1958. Professor.  
Experience: Assistant herdsman, research assistant, in charge of federal dairy breeding program, Ohio State University; Dairy Department, California State Polytechnic College, San Luis Obispo; Extension dairy specialist, Ohio State University.
- RIDDELL, STEVEN G. (1975)** ..... Coordinator, Alumni Services  
B.A., California Polytechnic State University, 1969; M.A., 1977.  
Experience: Public relations and advertising director, Set-Ro Company, Sacramento; post publications officer, Ft. Ord; division manager, Environmental Marketing Group, Sacramento; sales manager, KFBK-FM, Sacramento.
- RIDER, ROL W., JR. (1960)** ..... Business Administration  
B.A., University of California, 1941; M.A., 1967; Ph.D., University of Oregon, 1972. Professor.  
Experience: U.S. Naval Aviation (Reserve); flight operations and airport management, Pan American Airways; national sales manager, Royal Rinse, Inc.; divisional product-advertising manager, Carnation Co., Inc.; account executive, N.W. Ayer & Son, Inc.; account supervisor, Young & Rubicam, Inc.; management and marketing consultant.
- RIEDLSPERGER, MAX E. (1969)** ..... History  
A.B., Wabash College, 1959; M.A., University of Michigan, 1961; Ph.D., University of Colorado, 1969. Professor.  
Experience: Instructor, Bay de Noc Community College, Temple Buell College; teaching associate, University of Colorado.

- RIFE, WILLIAM C. (1977)** ..... Head, Chemistry Department  
B.A., North Central College, 1956; Ph.D., University of Illinois, 1960. Professor.  
Experience: Associate professor, Parsons College; patent scientist, Owens-Illinois Corporation, Toledo; chairman, chemistry department, North Central College; visiting lecturer, University of Illinois; chairman, humanities division, North Central College; NEH fellow, Pennsylvania State University.
- RIGGINS-PIMENTEL, RHONDA L. (1972)** ..... Biological Sciences  
B.S., Austin Peay State College, Tennessee, 1966; M.S., Iowa State University, 1969; Ph.D., 1972. Associate Professor.  
Experience: Teaching assistant, Iowa State University.
- RIHAL, SATWANT S. (1969)** ..... Architectural Engineering  
B.S., University of Delhi, India, 1961; M.S., University of Minnesota, 1964; Ph.D., University of New Mexico, 1969. Professor.  
Experience: Civil engineer, Central Water and Power Commission, New Delhi; structural engineer, T. T. Burnett Engineering Inc., Albuquerque; instructor, Department of Civil Engineering, Univ. of New Mexico; structural engineer, Pre-Stressed Concrete Products, Inc., Albuquerque; consultant, Hydro-Conduit Corporation, Albuquerque; structural engineer, Benito A. Sinclair and Associates, Los Angeles; senior structural engineer, Skidmore, Owings, and Merrill, Architects and Engineers, San Francisco. Registered civil engineer, California.
- ROACH, DAVID M. (1966)** ..... Physics  
B.S., South Dakota School of Mines and Technology, 1961; M.S., 1963; Ph.D., Oregon State University, 1974. Professor.  
Experience: Graduate assistant, instructor, South Dakota School of Mines and Technology; instructor, Wisconsin State University, Northrop Institute of Technology; engineer, Leach Corporation.
- ROCKMAN, ILENE F. (1975)** ..... Library  
B.A., University of California, Los Angeles, 1972; M.S.L.S., University of Southern California, 1974; M.A., California Polytechnic State University, 1978. Senior Assistant Librarian.  
Experience: Education librarian and research associate, Washington State University.
- RODGER, JAMES A. (1976)** ..... Acting Head, Construction Department  
Bachelor of Building Construction, University of Florida. 1970; M.S. Building Construction, University of Florida, 1977. Assistant Professor.  
Experience: Construction superintendent, general contractor.
- ROEST, ARYAN I. (1955)** ..... Biological Sciences  
B.S., University of Virginia, 1945; B.S., Oregon State College, 1948; M.S., 1949; Ph.D., 1954. Professor.  
Experience: Officer, U.S. Navy; teaching and research assistant, Oregon State College; assistant professor, Central Oregon College; forester, Oregon State Board of Forestry; lecturer, Extension Division, University of California; visiting assistant professor, University of California, Santa Barbara; lecturer, National Science Foundation Summer Science Program.
- ROGALLA, JOHN A. (1959)** ..... Agricultural Management  
B.S., California State Polytechnic College, 1956; M.S., Cornell University, 1958; Ph.D., 1968. Professor.  
Experience: Teaching and research assistant, Department of Agricultural Economics, Cornell University; farm management consultant, material control analyst, Ryan Aeronautical Company; U.S. Air Force.
- ROGERS, JOHN M. (1970)** ..... Computer Science and Statistics  
B.S., Marion College, 1962; M.S., Kansas State University, 1966; Ph.D., Virginia Polytechnic Institute and State University, 1975. Assistant Professor.  
Experience: Teacher, Jefferson Township High School and Army Education Center, Fort Riley, Kansas; graduate teaching assistant, Kansas State University; lecturer, California State Polytechnic College, San Luis Obispo.

- ROGERS, ROBERT L. (1974)** ..... Engineering Technology  
B.S., California Maritime Academy, 1969; M.S., Stanford University, California, 1972. Associate Professor.  
Experience: Instructor, California Maritime Academy, Vallejo; officer, U.S. Navy; second assistant engineer, Keystone Tankers; third assistant engineer, Kaiser Permanente, Pacific Far East Line, and Waterman Steamship.
- ROGERS, ROLF E. (1975)** ..... Management  
M.A., University of Washington, 1968; Ph.D., 1970. Professor  
Experience: Chief, management systems staff, Boeing Company; director, systems analysis staff, lecturer, University of Washington; associate professor, professor of management, University of Alberta, Canada; independent management consultant, United States and Canada.
- ROLLINGS, DAVID R. (1968)** ..... English  
A.B., University of Louisville, 1948; M.A., University of Michigan, 1949; additional graduate study. Assistant Professor.  
Experience: Assistant professor, Eastern Michigan University, Wisconsin State University, University of Puerto Rico, East Kentucky State College, Wisconsin State College.
- ROMNEY, JOSEPH B. (1969)** ..... History  
B.S., University of Utah; J.D., 1963; M.A., 1967; Ph.D., 1969. Associate Professor.  
Experience: Teaching assistant, University of Utah; associate dean, Communicative Arts and Humanities, California Polytechnic State University.
- ROSEN, ARTHUR Z. (1953)** ..... Physics  
A.B., University of California, 1941; Ph.D., 1952. Professor.  
Experience: Physicist, University of California Radiation Laboratory; U.S. Navy; teaching and research assistant, University of California; lecturer, University of California, Santa Barbara College.
- ROSENBERG, ROBERT L. (1970)** ..... History  
B.A., Stanford University, 1944; M.A., University of Washington, 1964; Ph.D., 1971. Associate Professor.  
Experience: Teacher, Bellevue Community College, Highline Senior High School, Washington
- ROSENMAN, MONA G. (1971)** ..... English  
B.A., University of Michigan, 1955; M.A., Case-Western Reserve University, 1960; Ph.D., Kent State University, 1970. Associate Professor.  
Experience: Teacher, Independence, Ohio, Winchester, Massachusetts, Beachwood, Ohio; teaching fellow, Kent State University.
- ROSENTHAL, BIANCA (1971)** ..... Foreign Languages  
B.S., University of Washington, 1952; M.A., 1966; Ph.D., 1970. Associate Professor.  
Experience: Teacher, Federal Way Senior High School, Washington; predoctoral associate; research assistant, University of Washington; instructor, Lake Washington Continuing Education; medical technologist, private physician's office and Providence Hospital; recipient, NEH, University of Texas; resident director, CSUC International Programs, Heidelberg, Germany.
- ROSKE, MILDRED E. (1967)** ..... Home Economics  
B.A., University of California, 1955; M.A., 1958; Ph.D., University of Oregon, 1975. Associate Professor.  
Experience: Interior designer, Sherman Oaks; teaching assistant, instructor, University of California; teacher, adult education, Los Angeles City Schools; instructor, Rochester Institute of Technology; teacher, Oxnard Evening School; graduate teaching fellow, University of Oregon.
- RUEHR, THOMAS A. (1974)** ..... Soil Science  
B.S., Ohio State University, 1966; M.S., Iowa State University, 1970; Ph.D., Colorado State University, 1974. Associate Professor.  
Experience: Graduate teaching assistant, Iowa State University; instructor in teaching and research, Colorado State University.

- RUGGLES, PHILIP K. (1966-67) (1971)** ..... Graphic Communications  
B.S., West Virginia Institute of Technology, 1965; M.S., South Dakota State University, 1966.  
Associate Professor.  
Experience: Contributing editor, Printing Impressions Magazines; consultant, U.S. Geological Survey, National Oceanic and Atmospheric Administration; chairman, Printing Management Technology, Columbus Technical Institute; staff member and consultant to PIA—Central Ohio; instructor, Arkansas State University; graduate teaching assistant, South Dakota State University; management and production positions in the printing and publishing industry.
- RUSSELL, CHARLES R. (1968)** ..... Mechanical Engineering  
B.S., Washington State College, 1936; M.S., California Institute of Technology, 1946; Ph.D., University of Wisconsin, 1941. Professor.  
Experience: Section head, General Motors Corp., U.S. Atomic Energy Commission; program administrator, Navy Bureau of Ordnance; engineer, Procter and Gamble, Dow Chemical. Registered professional engineer, California, Michigan, Virginia, and District of Columbia.
- RUSSELL, JOHN G. (1968)** ..... Music  
A.B., California State University, Fresno, 1959; M.A., California State University, Chico, 1968. Associate Professor.  
Experience: Pianist; composer; instructor, California State University, Fresno; assistant professor, California State University, Chico; conductor, Mozart Festival Singers.
- RUTHERFORD, ROBERT T. (1974)** ..... Animal Science  
B.S., University of California, Davis, 1970; graduate study, University of California, Davis, 1971. Assistant Professor.  
Experience: Director of vocational agriculture, El Cajon Valley High School.
- RUTTY, KIP (1978)** ..... Public Affairs  
B.A., University of California, Berkeley, 1968.  
Experience: Agricultural editor, Idaho Statesman; regional editor, Nampa (Idaho) Free Press; reporter, United Press International, Seattle and Boise; news editor, Sammamish (WA) Valley News; Production assistant, National Geographic Society Films, Los Angeles.
- RYAN, L. DIANE (1974)** ..... Counselor, Financial Aid  
B.A., California Polytechnic State University, San Luis Obispo, 1973; M.A., 1976.  
Experience: Accounting/data processing; instructor, Speech Communication; graduate intern, Financial Aid, California Polytechnic State University, San Luis Obispo.
- SAAM, PATRICIA (1966)** ..... Home Economics  
B.S., College of St. Catherine, St. Paul, 1950; M.S., California Polytechnic State University, 1973. Associate Professor.  
Experience: Dietetic internship, research-pediatrics dietitian, University of Minnesota; head dietitian, Paso Robles War Memorial Hospital, Sierra Vista Hospital; dietitian, dining hall, California Polytechnic State University.
- SABOL, JOSEPH E. (1972)** ..... Agricultural Education  
B.S., Fresno State College, 1963; M.Ed., University of California, 1965; Ph.D., Colorado State University, 1976. Associate Professor.  
Experience: Instructor, Vocational Agriculture, Orestimba Union High School, Newman; instructor, Agricultural Sciences, Mount San Antonio College.
- SABTO, JACQUES C. A. (1968)** ..... Electronic and Electrical Engineering  
B.E.E., Cairo University, 1948; Ingenieur Radio-ESE, Ecole Supérieure D'Electricite, Paris, 1951; E.E., Columbia University, 1959; additional graduate study, New York University. Professor.  
Experience: Lecturer, City College of New York and Institute of Technology, Hoboken, New Jersey; adjunct professor, Newark College of Engineering; development engineer, I.T.T., Nutley, New Jersey; technical staff, Bell Telephone Laboratories, Holmdel, New Jersey; ASEE-NASA fellow, Norcus Fellow; visiting professor, Arizona State University, Tempe.

- SALO, GLENN W. (1955)** ..... Agricultural Engineering  
B.S., Montana State College, 1950; M.S., University of Idaho, 1955; additional graduate work, University of California, Davis. Professor.  
Experience: Shops officer, U.S. Air Force; instructor and assistant agricultural engineer, University of Idaho; research fellow, University of Idaho; junior civil engineer, California Department of Water Resources; agricultural engineer, Anderson Steel Buildings. Registered professional engineer, California.
- SALTZMAN, JUDY D. (1975)** ..... Philosophy  
B.A., San Jose State University, 1963; M.A., University of California, Berkeley, 1965; M.A., 1973; Ph.D., University of California, Santa Barbara, 1977; Fulbright scholar, Freie Universitat, Berlin, 1970-71. Assistant Professor.  
Experience: Teaching assistant, University of California, Berkeley and Santa Barbara; instructor, Santa Barbara City College and Ventura College; junior fellow, Center for the Study of Democratic Institutions.
- SANCHEZ, DAVID J. (1970)** ..... Coordinator, Ethnic Studies; Education  
B.B.A., University of Texas at El Paso, 1950; graduate study, University of California, Santa Barbara. Associate Professor.  
Experience: Junior high teacher, Tornillo, Texas; insurance agent; teacher, Lucia Mar Unified School District, Pismo Beach; lecturer, California State Polytechnic College, San Luis Obispo.
- SANDERSON, JAMES D. (1967)** ..... Coach, Physical Education  
A.B., Fresno State College, 1962; M.S., California State Polytechnic College, 1969.  
Experience: Teacher and coach, Tulare Western High School, Tulare, and Sierra High School, Tollhouse.
- SANDLIN, DORAL R. (1969)** ..... Aeronautical Engineering  
B.S., U.S. Naval Academy, 1954; M.S., Air Force Institute of Technology; Ph.D., University of Arizona, 1972. Professor.  
Experience: Flight test maintenance officer and pilot, U.S. Air Force; missile branch chief, Holloman Air Force Base, New Mexico; chief, aeromechanics branch, Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio.
- SAN JULIAN, GARY J. (1979)** ..... Natural Resources Management  
B.S., West Virginia University, 1970; M.Ed., Clemson University, 1974; Ph.D., Colorado State University, 1978. Assistant Professor.  
Experience: Science teacher, Woodruff, South Carolina; research assistant, Clemson University; associate county agent, Abbeville, South Carolina; teaching assistant and instructor, Colorado State University.
- SANKOFF, LEO (1946)** ..... Agricultural Education  
B.S., California State Polytechnic College, 1942; M.A., 1956. Professor.  
Experience: Agricultural instructor, Fillmore High School.
- SAVEKER, DAVID R. (1968)** ..... Architectural Engineering  
A.B., Stanford University, 1941; Certificate Naval Architecture, U.S. Naval Academy Post Graduate School, 1942; M.S., Naval Architecture & Marine Engineering, Massachusetts Institute of Technology, 1946; Certificate Naval Warfare, U.S. Naval War College, 1959; additional graduate study, California Polytechnic State University, 1968-69. Associate Professor.  
Experience: Engineering duty officer, officer in charge of Underwater Explosions Research Division, Norfolk Naval Shipyard, nuclear test program officer, new construction and ship repair, Puget Sound Naval Shipyard; Pacific Fleet Staff; officer in charge, Naval Engineering Curricula, Naval Post Graduate School, Monterey; senior management and command duties, U.S. Navy; ocean engineering consultant.
- SCHAFFNER, DAVID J. (1972)** ..... Agricultural Management  
B.S., University of California, Davis, 1964; M.B.A., University of California, Berkeley, 1970. Associate Professor.  
Experience: Marketing analyst, Calcot Ltd., Bakersfield; specialty food marketing, Holly World Foods, Inc., San Francisco; officer, U.S. Army.

- SCHEFFER, PAUL E. (1964)** ..... Industrial Engineering  
B.M.E., University of Minnesota, 1947; M.S., University of Southern California, 1959. Professor.  
Experience: Chief industrial engineer, Crane Company; senior industrial engineer, U.S. Rubber Company; engineer, Appraisal Service Company; instructor, University of Minnesota. Registered professional engineer, California.
- SCHLEICHER, HELMUT L. (1970)** ..... Construction  
B.A., Kaiser-Friedrich Mannheim College, Germany, 1936; M.S., Technical University, Munich, Germany, 1945; Ph.D., University of Munich, Germany, 1948; additional graduate study, University of Hawaii. Professor.  
Experience: Chief planner and associate, Kaiser Engineers International, Oakland; vice pres./general manager, Allied Pacific & W&F Mech. Contract., Hawaii; manager, mechanical division, Alliance Companies, Los Angeles & Hawaii; project engineer, Dillingham Corp./Haw Dredging & Construction, Hawaii; construction superintendent, various firms in California. Registered Wirtschaftsingenieur, Germany; licensed general and mechanical contractor, Hawaii.
- SCHMIDT, RICHARD J. (1979)** ..... Accounting  
B.S., University of Utah, 1961; M.B.A., 1962; Ph.D., University of Santa Clara, 1979. Associate Professor.  
Experience: Instructor, Chabot College; market development manager, Kaiser Aluminum and Chemical Corp.; economic evaluation engineer, Dow Chemical Co.; C.P.A.
- SCHROEDER, WALTER P. (1957)** ..... Head, Education Department  
B.S., Michigan State University, 1940; M.A., 1947; Ph.D., 1953. Professor.  
Experience: Three years technical and management work in agriculture, business and industry; teacher, supervising teacher, and administrator in junior and senior high schools and unified districts, assistant professor, vocational education and education, Michigan State University; assistant placement director, Michigan State University.
- SCHULTZ, NED W. (1976)** ..... Child Development  
B.S., Pennsylvania State University, 1973; M.A., 1975; Ph.D., Ohio State University, 1976. Assistant Professor.  
Experience: Head graduate teaching associate, teaching assistant, Ohio State University.
- SCHUMANN, THOMAS G. (1971)** ..... Physics  
B.S., California Institute of Technology, 1958; M.A., University of California, Berkeley, 1960; Ph.D., 1965. Associate Professor.  
Experience: Research assistant, Lawrence Radiation Laboratory; research associate, Brookhaven National Laboratory; assistant professor, City College of City University of New York; lecturer, California State College, Hayward.
- SCHWARTZ, ARTHUR L. (1975)** ..... Business Administration  
B.B.A., University of Michigan, 1967; M.B.A., 1968; Ph.D., University of Oregon, 1975. Associate Professor  
Experience: Production control supervisor, Wolverine Knitting Mills, Bay City, Michigan; investment analyst, Prudential Insurance Company, Newark, New Jersey; assistant vice-president, Watling, Lerchen and Company, Inc., Detroit; teaching fellow and research assistant, University of Oregon.
- SCHWARTZ, KENNETH E. (1952)** ..... Associate Dean, School of Architecture  
and Environmental Design  
B. Arch., University of Southern California, 1952; graduate study, Pennsylvania State University, Rensselaer Polytechnic Institute, University of Manchester, England. Professor.  
Experience: Draftsman, Douglas Aircraft Company; draftsman-designer, various Los Angeles architectural firms; private practice, San Luis Obispo; San Luis Obispo Planning Commission; mayor, San Luis Obispo, 1969-1979. Registered architect, California. F.A.I.A.
- SCOTT, JACK F. (1967)** ..... Agricultural Management  
B.S., California State Polytechnic College, 1961; M.A., 1967.  
Experience: Director of vocational agriculture, Galt Joint Union High School, Galt.



- SCOTT, PAULA ROSEMARY (1973) ..... Library  
 B.A., University of California, Los Angeles, 1965; M.L.S., 1966; graduate study, M.A., Monterey Institute of Foreign Studies, 1974. Senior Assistant Librarian.  
 Experience: Serials-Reference librarian, Biomedical Library, University of California, Los Angeles; reference librarian, University of California, Santa Cruz; translator, Joint Publications Research Service, San Francisco.
- SCOTTO, KENNETH C. (1970) ..... Animal Science  
 B.S., California Polytechnic State University, San Luis Obispo, 1966; M.S., University of Nevada, 1969; Ph.D., Washington State University, 1975. Associate Professor.  
 Experience: Instructor, University of Nevada, Reno; graduate research assistant, University of Nevada; ranch and farming operations, California.
- SEABERG, DUANE O. (1965) ..... Agricultural Management  
 B.S., California State Polytechnic College, 1960; M.A., 1963. Professor.  
 Experience: Farming; instructor, Ferndale Union High School.
- SEDLITZKY, MARCEL E. (1976) ..... Architecture  
 B.S. Arch., University of Cincinnati, 1952; M. Arch., University of California, Berkeley, 1973. Associate Professor.  
 Experience: Principal, private architectural practice, Carmel; associate, Robert Jones Architect & Associates, Carmel; associate, Victor Gruen Associates, Beverly Hills; draftsman-designer, Austria; lecturer, East Los Angeles Junior College and Monterey Peninsula Lyceum.
- SEIM, EDWIN C. (1978) ..... Soil Science  
 B.S., University of Missouri, 1954; M.S., University of Minnesota, 1966; Ph.D., 1970. Assistant Professor.  
 Experience: Agronomist, Allied Chemical Corp.; research and teaching assistant, University of Minnesota; post-doctoral research, University of Nebraska; senior horticulturist, Hunt-Wesson Foods; agronomist, Basic Vegetable Inc.
- SENNETT, ROBERT EARL (1970) ..... Civil Engineering  
 B.S., University of Pennsylvania, Philadelphia, 1959; M.S., 1961; Ph.D., 1963. Professor.  
 Experience: Assistant professor, University of California, Santa Barbara; senior structural dynamicist, General Motors Defense Research Laboratories, Santa Barbara; assistant instructor-teaching fellow, University of Pennsylvania; research engineer, Dyna/Structures, Inc., Springfield, Pennsylvania.
- SERVATIUS, OWEN L. (1947) ..... Management  
 B.S., California State Polytechnic College, 1959; M.A., 1964. Professor.  
 Experience: Brokers' clerk, Baker-Fentress & Co., Chicago; U.S. Navy; department head, Business Administration, California State Polytechnic College.
- SETTLE, ALLEN K. (1970) ..... Political Science  
 B.A., University of California, Santa Barbara, 1966; M.A., 1967; Ph.D., 1970. Associate Professor.  
 Experience: Instructor, Santa Barbara City College; intern-fellow, American Political Science Association; research assistant, University of California, Santa Barbara; San Luis Obispo Planning Commission and City Council.
- SHAFFER, RICHARD A. (1974) ..... Social Sciences  
 B.A., Stanislaus State College, 1971; M.A., University of Notre Dame, 1974; Ph.D., 1975. Assistant Professor.  
 Experience: NIMH Traineeship, University of Notre Dame.
- SHAH, RAMESH T. (1969) ..... Mechanical Engineering  
 B.E., Maharaja Sayajirao University of Baroda, India; Dr. Ing., Hochschule Fur Schwermaschinenbau, Magdeburg, Germany, 1959. Professor.  
 Experience: Professor, reader, lecturer, and demonstrator, Faculty of Technology and Engineering, University of Baroda, India.

**SHARP, HARRY W., JR. (1975)** ..... Head, Speech Communication Department  
A.B., University of the Pacific, 1959; M.S., Purdue University, 1961; Ph.D., 1967. Assistant Professor.

Experience: Instructor, College of Wooster; visiting lecturer, Humboldt State College; assistant professor, University of California, Davis.

**SHAW, WAYNE F. (1966)** ..... Sports Information Director  
B.A., University of Iowa, 1951.

Experience: Sports writer-editor, reporter for newspapers at Sibley, Ottumwa, Boone and Sioux City, Iowa, Twin Falls, Idaho; sports informations director, South Dakota State; assistant SID, Indiana University; member, Board of Directors College Sports Information Directors of America (1976-79).

**SHEIK, HABIB (1967)** ..... English  
B.S., California State University, Fresno, 1959; A.B., 1960; M.A., California Polytechnic State University, 1961; M.A., University of California, Los Angeles, 1966; Ph.D., University of Nebraska, 1979. Assistant Professor.

Experience: English tutor, project "Upward Bound," University of California; instructor, Vietnamese Leadership/Scholarship Program, California Polytechnic State University.

**SHELTON, DONALD L. (1973)** ..... Director, Personnel Relations  
B.G.E., University of Omaha, 1958; B.S., University of Southern California, 1960; M.S., 1960.

Experience: Director of personnel, air force bases in Spain, Louisiana, Japan, California; chief of officer assignments, Strategic Air Command, Omaha; professor of aerospace studies, Loyola University, Los Angeles; director of officer personnel, Headquarters Air University, U.S. Air Force; principal personnel analyst, The California State University and Colleges.

**SHIERS, ALDEN F. (1975)** ..... Economics  
B.S., University of Maine, 1967; Ph.D., University of California, Santa Barbara, 1977.

Experience: Teaching assistant and research assistant, University of California, Santa Barbara.

**SHUTT, NOEL M. (1975)** ..... Animal Science  
B.S., California State Polytechnic College, 1971; M.S., University of Missouri, 1972. Assistant Professor.

Experience: Cattle herdsman and hog farming, Missouri; instructor, University of Missouri; research assistant, Electron Microscopy, University of Missouri. Certified artificial inseminator.

**SILVA, CLAUDIO Y. (1975)** ..... Foreign Languages  
B.A., Claremont Men's College, 1951; M.A., University of Southern California, 1964; Ph.D., 1970. Associate Professor.

Experience: Assistant professor, San Jose State University; teacher, Whittier, Anaheim, and Riverside High School Districts.

**SILVER, GORDON A. (1964)** ..... Physics  
B.S., University of California, Los Angeles, 1959; M.S., 1961; additional study, University of California, Berkeley. Associate Professor.

Experience: Instructor, American Television Labs, Los Angeles Valley College; research engineer, Electrosonic Systems, Inc.; associate investigator, Children's Hospital, Los Angeles.

**SILVERS, ARTHUR H. (1976)** ..... Architecture  
B. Arch., University of Southern California, 1959; M.A., 1978. Associate Professor.

Experience: Associate vice president, Daniel, Mann, Johnson and Mendenhall; architect-planner, Kennard and Silvers; owner, Arthur H. Silvers and Associates; graduate school lecturer, critic, Cal Poly, Pomona and UCLA; design critic, USC. Member: AIA. Director, National Organization of Minority Architects. Registered architect, California.

**SIMEK, JAN. W. (1977)** ..... Chemistry  
B.A., Kalamazoo College, 1970; M.S., Stanford University, 1971; Ph.D., 1975. Assistant Professor.

Experience: Laboratory assistant, Kalamazoo College; teaching assistant, Stanford University; research assistant, Upjohn Company; visiting instructor, Albion College; lecturer, University of Colorado; assistant professor, Kalamazoo College.

- SIMMONS, JAMES E. (1966)** ..... English  
B.A., University of California, Santa Barbara, 1959; M.A., University of Wisconsin, 1960; Ph.D., 1966. Professor.  
Experience: Assistant professor, Wisconsin State University; associate dean, School of Applied Arts and School of Communicative Arts and Humanities, California Polytechnic State University.
- SIMMONS, ORLEN W. (1961)** ..... Metallurgical Engineering  
B.S.E., University of Michigan, 1935; M.S.E., 1948. Professor.  
Experience: Metallurgist, Carnegie-Illinois Steel Company, Packard Motor Car Company; instructor, Rose Polytechnic Institute; officer, U.S. Navy; research engineer, Battelle Memorial Institute; senior research engineer, Frankford Arsenal, Rem Cru Titanium Company and Crucible Steel Company, Climax Molybdenum Company. Registered professional engineer, Ohio and California.
- SLEM, CHARLES M. (1975)** ..... Psychology  
B.A., University of California, Los Angeles, 1968; M.A., 1972; Ph.D., Wayne State University, 1975. Assistant Professor.  
Experience: Predoctoral internship, Langley Porter Neuropsychiatric Institute, University of California, San Francisco; administrator, HOTLINE, Oakland County, Michigan; research assistant, Los Angeles Department of Mental Health.
- SMALL, DANIEL (1978)** ..... Medical Officer  
A.B., Brown University, 1971; M.M.S., 1973; M.D., 1975; Diplomate American Board of Internal Medicine, 1978; Board Eligible American Board of Rheumatology.  
Experience: Internship, Roger Williams General Hospital, Providence, Rhode Island; Fellowship in Rheumatology, Scripps Clinic and Research Foundation, LaJolla.
- SMIDT, ROBERT K. (1978)** ..... Computer Science and Statistics  
B.S., Manhattan College, 1971; M.S., Rutgers University, 1973; Ph.D., University of Wyoming, 1976. Associate Professor.  
Experience: Assistant professor, University of Florida, Oregon State University; instructor, Continuing Education Institute, Rutgers University, Fashion Institute of Technology; statistician, Fred Streit Associates., Department of Defense, Division of Business and Economic Research, Wyoming.
- SMITH, DALE A. (1973)** ..... Veterinary Science  
B.S., School of Veterinary Medicine, University of California, Davis, 1971; D.V.M., 1973. Associate Professor.  
Experience: Large animal practice, San Joaquin Valley.
- SMITH, DOUGLAS B. (1977)** ..... English  
B.A., Johns Hopkins University, 1969; M.A., Fairfield University, 1975; additional study, Rensselaer Polytechnic Institute. Assistant Professor.  
Experience: Technical communication consultant; technical editor, Center for Urban Development, Troy, New York; teaching assistant, Rensselaer Polytechnic Institute; Peace Corps Volunteer (Afghanistan); probation officer for juvenile court, Baltimore.
- SMITH, HOLLY (1976)** ..... Activities Planning Center  
B.S., San Jose State University, 1975.  
Experience: Residence hall activities program coordinator, California Polytechnic State University; recreation-public relations specialist, Sunnyvale Parks and Recreation Department.
- SMITH, HOWARD F. (1968)** ..... Economics  
A.B., Wayne State University, 1940; M.B.A., Harvard University, 1942; M.A., American University, 1952; Ph.D., 1963. Professor.  
Experience: Economist, War Production Board; economic advisor, supreme commander for Allied Powers, Tokyo and Okinawa; international economist, Department of State; foreign service officer, Thailand, Ceylon, Congo; member of Presidential Study Mission to Korea; deputy director, U.S. Aid Mission, Congo; coordinator, U.S. Aid to Africa; director, Ghana Aid Program; officer, U.S. Army.

- SMITH, J. MURRAY (1960) ..... Speech Communication  
B.A., University of Denver, 1940; M.A., 1947. Professor.  
Experience: Instructor in English and speech, Denver University, Michigan State University and Wichita University; technical director, Denver Civic Theater; president, the Knitter Company (mfg.), Denver; staff director, Pasadena Playhouse; officer, U.S. Marine Corps.
- SMITH, KEITH V. (1978) ..... Agricultural Education  
B.S., California Polytechnic State University, San Luis Obispo, 1958; M.A., 1964. Associate Professor.  
Experience: Instructor, Washington Union High School, Fresno and El Dorado Union High School, Placerville; supervisor, Bureau of Agricultural Education, Sacramento.
- SMITH, NELSON L., III (1962) ..... Industrial Technology  
B.S., Lowell Technological Institute, 1960; M.S., 1962; additional graduate study, University of Iowa. Professor.  
Experience: Senior systems analyst, quality control engineer, Raytheon Company, Lowell, Massachusetts.
- SMITH, PATRICK DAVIS, JR. (1975) ..... Vocational Education Productions  
B.A., Florida Technological University, 1975; graduate study, California Polytechnic State University.  
Experience: Commercial studio photographer, Cocoa, Florida; assistant to Director of Institutes and Conferences, Florida Technological University; freelance photography and multimedia.
- SMITH, STANLEY B. (1978) ..... Business Administration  
B.S., University of Utah, 1953; M.B.A., 1962; D.B.A., University of Southern California, 1978. Professor.  
Experience: Department manager, J. C. Penney Co.; commissioned officer, USAF; assistant director of personnel, University of Utah; assistant to the president, associate dean, professor, California State Polytechnic University, Pomona.
- SNETSINGER, JOHN G. (1970) ..... History  
A.B., University of California, Los Angeles, 1963; M.A., University of California, Berkeley, 1966; Ph.D., Stanford University, 1969; additional graduate study, Stanford School of Law. Associate Professor.  
Experience: Instructor, San Jose State College.
- SNYDER, DAVID H. (1970) ..... Admissions Officer  
B.A., California Polytechnic State University, San Luis Obispo, 1973; M.A., 1975.  
Experience: Credit manager, Sears Roebuck & Co., Glendale; supervising clerk, assistant administrative analyst, California Polytechnic State University.
- SOMPPI, SUSAN (1978) ..... Reading Specialist, Educational Opportunity Program  
B.S., University of Texas, 1970; M.A., California Polytechnic State University, 1978.  
Experience: elementary teacher and community newspaper assistant, Texas; medical laboratory computer transcriber, California; coordinator, residential treatment center, California; elementary and junior high teacher, California; medical transcriber, California Polytechnic State University.
- SORENSEN, L. ROBERT (1966) ..... Head, Psychology Department  
B.A., Pomona College, 1948; M.A., Claremont Graduate School, 1951; Ph.D., 1966. Professor.  
Experience: Assistant to dean of students, Pomona College; lecturer, assistant director Industrial Relations Center, administrative assistant Jet Propulsion Lab, and associate director of development, California Institute of Technology; assistant in development, assistant dean, Claremont Graduate School.
- SOTO, SHIRLENE A. (1977) ..... History  
B.A., San Francisco State University, 1969; M.A., University of New Mexico, 1971; Ph.D., 1977. Assistant Professor.  
Experience: Graduate assistant and instructor, University of New Mexico.

- SPARLING, SHIRLEY R. (1963)** ..... Biological Sciences  
B.S., Iowa State College, 1950; M.S., 1951; Ph.D., University of California, 1956; additional graduate study, University of Michigan, Stanford University. Professor.  
Experience: Instructor, Central College; lecturer and instructor, University of British Columbia; instructor and assistant professor, University of California at Santa Barbara, University of Oregon Institute of Marine Biology.
- SPENCER, RUTH G. (1967)** ..... Library  
B.A., Milwaukee-Downer College, 1938; B.L.S., University Library of Chicago, 1945; additional graduate study, University of Wisconsin. Senior Assistant Librarian.  
Experience: Cataloger and reference librarian, Milwaukee Public Library; librarian, U.S. Public Health Service, Cincinnati; cataloger, Northrop Aircraft; reference librarian, Los Angeles Public Library.
- SPODEN, PATRICIA S. (1975)** ..... Activities Planning Center  
B.A., St. Cloud University, 1969; M.A., University of Iowa, 1971.  
Experience: Activities advisor, University of Iowa; program coordinator, Larkwood Community College.
- STAHL, VERLAN H. (1968)** ..... Head, Foreign Languages Department  
B.A., College of the Pacific, 1950; M.A., Florida State University, 1955; Ph.D., University of Madrid, 1969. Professor.  
Experience: American program officer, Fulbright Commission and in-service English teacher, Standard Electric Co., Madrid; instructor, Wake Forest College, Winston-Salem; teaching assistant, Florida State University.
- STALLARD, MARY L. (1965)** ..... Physical Education  
B.A., Fresno State College, 1957; M.S., University of Washington, 1965; Ph.D., University of Utah, 1974. Professor.  
Experience: Instructor, Hamilton Junior High, Fresno; teaching assistant, University of Washington; part-time instructor and coach, University of Utah.
- STANSFIELD, WILLIAM D. (1963)** ..... Biological Sciences  
B.S., California State Polytechnic College, 1953; M.A., 1959; M.S., University of California, Davis, 1962; Ph.D., 1963. Professor.  
Experience: Cadet teacher, Chaffey Union High; line officer, U.S. Naval Reserve; vocational agriculture teacher, Fortuna Union High School; teaching assistant and research assistant, University of California.
- STARKEY, EUGENE E. (1978)** ..... Head, Dairy Science Department  
B.S., California Polytechnic State University, 1952; M.S., University of Wisconsin, 1954; Ph.D., 1958. Professor.  
Experience: Assistant professor, Utah State University; professor, University of Wisconsin.
- STEARNS, JOSEPHINE S. (1969)** ..... Child Development  
B.A., University of New Hampshire, 1958; M.A., Michigan State University, 1969. Associate Professor.  
Experience: Nursery school teacher, Lansing, Michigan; associate 4-H Youth Development Agent, Milford, N.H.; utility demonstrator, Malden, Massachusetts.
- STECHMAN, JOHN V. (1960)** ..... Animal Science  
B.S., University of California, Davis, 1957; M.S., 1960. Professor.  
Experience: Range aid, U.S.D.A. Forest Service, Agricultural Research Service; research assistant, University of California, Davis; biological assistant, U.S. Army; range consultant, state and federal agencies and private industry; ranching partner, San Luis Obispo.
- STEELE, F. RAYMOND, JR. (1968)** ..... Food Science  
B.A., California Polytechnic State University, 1956; M.S., Cornell University, 1967; Ph.D., 1968. Professor.  
Experience: Teaching assistant, University of Southern California; division manager, Sears Roebuck and Co.; brewer, Pabst Brewing; instructor, California State Polytechnic College; participant, Academic Year Institute, radiation biology, and research assistant, Department of Food Science, Cornell University; naval aviator, U.S. Navy.

- STEINBERG, HOWARD (1970)** ..... Mathematics  
B.M.E., City College of New York, 1950; M.S., New York University Graduate School, 1966; Ph.D., 1969. Professor.  
Experience: Manager of Missile Equipment and Ordnance Department, Maxson Electronics Corp.; manager mechanics program, Kollsman Instrument Corp.; engineering and mathematical consultant; assistant professor, Mathematics Research Center, University of Wisconsin.
- STEWART, PATRICIA A. (1971)** ..... Coordinator, Learning Assistance Center  
B.S., California State Polytechnic College, 1970; M.A., California Polytechnic State University, 1972.  
Experience: Teacher aide, Kern High School District; graduate intern, placement interviewer and supervisor, California Polytechnic State University.
- STINE, WILLIAM B. (1973)** ..... Mechanical Engineering  
B.S., West Virginia University, 1958; M.B.A., University of Southern California, 1963; M.S., 1963; Ph.D., 1972. Associate Professor.  
Experience: Senior design engineer, North American Rockwell, Inc.; lecturer, research assistant, research associate, University of Southern California.
- STOCKER, STEVEN O. (1969)** ..... Engineering Technology  
B.S.E.L., California Polytechnic State University, 1973. Assistant Professor.  
Experience: Mechanical engineer, Lawrence Livermore Laboratory; industrial engineer, FMC Corporation.
- STOFFEL, EDWARD O. (1957)** ..... Mechanical Engineering  
B.M.E., University of Santa Clara, 1950; M.E., 1955; M.S.M.E., Oregon State University, 1968. Professor.  
Experience: Engineer, Autonetics, Aerojet-General, Northrop Aircraft; Robertshaw-Fulton Controls, Norris-Thermador Corp.; chemist, U.S. Industrial Chemicals. Registered professional engineer, California.
- STOWE, KEITH S. (1971)** ..... Physics  
University of Gottingen, Germany, 1964; B.S., Illinois Institute of Technology, 1965; Ph.D., University of California, San Diego, 1971. Associate Professor.  
Experience: National Science Foundation trainee, research assistant, University of California, San Diego.
- STRASSER, J. EDWARD (1960)** ..... Industrial Technology  
B.S., California State Polytechnic College, 1958; M.B.A., Golden Gate College, 1967. Professor.  
Experience: Construction mechanic, Pacific Electric Company, Anchorage; machinist, MEFCO Mfg., Glendale; draftsman, I.D.S., Inc., Glendale; tool and die maker, Arrowsmith Tool & Die Corp., Los Angeles; sales engineer, O'Brien Machinery, Inc., Los Angeles; control systems analyst, Boeing Company, Seattle; installation manager, Western Electric. Licensed general engineering and building contractor.
- STRICKMEIER, HENRY B. (1970)** ..... Mathematics  
B.S., Texas Lutheran College, 1962; M.A., University of Texas, 1967; Ph.D., 1970. Associate Professor.  
Experience: Teacher, Galveston Independent School District; teaching assistant and teaching associate, University of Texas.
- STROHMAN, ROLLIN D. (1969)** ..... Agricultural Engineering  
B.S., University of Illinois, 1962; M.S., 1965; Ph.D., Purdue University, 1969. Associate Professor.  
Experience: Research engineer, John Deere Company; agricultural engineer, USDA, ARS, WURDD.
- STRONG, CHARLES W. (1971)** ..... English  
B.S., Arizona State University, 1965; M.A., University of Missouri, 1969. Associate Professor.  
Experience: Supervisor, technical communication, Motorola Semiconductor Products, Inc.; instructor, University of Missouri; teacher, Judson Private School, Scottsdale, Arizona.

- STUART, JOHN S. (1964)** ..... Architecture  
B.Arch., Texas Technological College, 1950; M.A., California Polytechnic State University, 1974. Professor.  
Experience: Private practice, Schmidt & Stuart; designer and supervisor, Atcheson & Atkinson, Architects. Registered architect and registered engineer, Texas.
- STUBBS, DANIEL F. (1963-66) (1968)** ..... Computer Science and Statistics  
B.S., Purdue University, 1960; M.S., Rensselaer Polytechnic Institute, 1962; Ph.D., 1973. Professor.  
Experience: Teaching assistant, Purdue University; engineer, Knolls Atomic Power Laboratory; instructor, California State Polytechnic College, San Luis Obispo.
- STULTZ, W. FRED (1977)** ..... Child Development  
B.A., University of Southern Colorado, 1970; M.S., Purdue University, 1973; Ph.D., 1974. Assistant Professor.  
Experience: Assistant professor, University of Iowa; assistant professor, Ohio State University; research associate, Ohio Agricultural Research and Development Center (Wooster).
- SUCHAND, GEORGE J. (1971)** ..... Social Sciences  
B.A., Louisiana State University, 1958; M.A., University of Florida, 1967; Ph.D., University of Oklahoma, 1972; M.S., California Polytechnic State University, 1978. Associate Professor.  
Experience: Assistant professor, Georgia Southwestern College; teaching assistant, University of Oklahoma; map librarian, University of Florida; officer, U.S. Navy.
- SUHR, MOON JA MINN (1969-71) (1972)** ..... Physical Education  
B.S., Ewha Women's University, Seoul Korea, 1963; M.A., Colorado State College, 1969. Associate Professor.  
Experience: Dance instructor, Kong-Ju Teacher's College, Middle and High School, King-Ju, Korea; dance instructor, Sook Myoung Girls' Middle High School, Seoul, Korea; ballet instructor, Creative Art Center, Greeley Colorado.
- SULLIVAN, GERALD J. (1968)** ..... English  
B.A., University of Wichita, 1957; M.A., University of Oklahoma, 1959; Ph.D., 1964. Professor.  
Experience: Instructor, University of Wisconsin, University of Arizona; teaching assistant, University of Oklahoma; assistant professor, North Texas State University.
- SUMMERL, PAMELA (1974)** ..... Coordinator, Educational Placement  
B.S., California State University, Long Beach, 1974; M.B.A., California Polytechnic State University, San Luis Obispo, 1976.  
Experience: Marketing specialist, Data Technology Corp., Santa Ana; placement interviewer, recruiting coordinator, Placement Center, California Polytechnic State University.
- SUMMERS, MARY JO (1962)** ..... Registered Nurse  
R.N., University of Oregon, Eugene, 1939; B.S., 1939.  
Experience: Los Angeles County Hospital.
- SUTLIFF, DALE A. (1973)** ..... Landscape Architecture  
B.S.L.A., California State Polytechnic University, Pomona, 1965; M.R.P., University of Pennsylvania, 1973. Associate Professor.  
Experience: Landscape architect/planner, Rahenkamp, Sachs, Wells and Associates, Philadelphia; landscape architect/planner, State Department of Parks and Recreation, Sacramento, Santa Barbara; landscape designer, Julio Juan Veyna, A.S.L.A., Santa Barbara. Registered landscape architect, California.
- SWANSEN, VERN (1971)** ..... Architecture  
B. Arch., University of Southern California, 1939; M. Arch., University of Strathclyde, 1975. Associate Professor.  
Experience: Post arts director, Special Services, Fifth Army Headquarters; lecturer, Westmont College; instructor, Santa Barbara City College; curator of education, Santa Barbara Museum of Art.

SWANSON, BESSIE R. (1977) ..... Head, Music Department  
A.B., B.Mus., University of the Pacific, 1943; M.A., 1952; Dr. Mus. Arts, Stanford University, 1967. Professor.

Experience: Professor and chairman, Music Education Department, University of Michigan; associate professor and chairman, Music Education Department, University of Washington; consultant, Sacramento County Schools; teacher/supervisor of music, Visalia Public Schools; special music teacher, Vista Public School.

SWANSON, CLIFTON E. (1967) ..... Music  
B.A., Pomona College, 1963; M.M., University of Texas, 1965; additional graduate study, University of California. Professor.

Experience: Teaching assistant, University of Texas, University of California; assistant professor, Portland State College; member, Group for Contemporary Music, Portland; musical director and conductor, San Luis Obispo Mozart Festival and San Luis Obispo County Symphony.

SWEARINGEN, DON E. (1974) ..... Architecture  
B. Arch., Oklahoma State University, 1968; M. Arch., University of Illinois, 1972. Associate Professor.

Experience: Architectural designer/delineator, Leon Rimov & Associates; partner, Mobile Environmental Systems; associate instructor, University of Illinois; architectural designer/delineator, Smith Dyer, Uggerby, LeGrande and J. Curman Architects, Sweden; researcher, Larsen and Nielsen A/S, Sweden; architectural designer, Dyer and Uggerby Architects; architectural designer/draftsman, Hudgins, Thompson, Ball & Associates and Phillips Petroleum Company.

SWEET, MARY D. (1969) ..... Philosophy  
B.A., M.A., University of Missouri, 1963; Ph.D., 1969. Associate Professor.

Experience: Instructor, Woodbury College, Northern Arizona University; assistant instructor, University of Missouri.

SYER, JOHN C. (1975) ..... Political Science  
B.A., Trinity College, Connecticut, 1962; M.A., University of California, Santa Barbara, 1968; Ph.D., 1973; additional graduate study, University of Michigan. Assistant Professor.

Experience: Teaching assistant, University of California, Santa Barbara; county government intern, American Political Science Association; lecturer, University of California Extension; assistant professor, Sangamon State University (Illinois); U.S. Army.

TALBOTT, LAURENCE F. (1966) ..... Acting Head, Industrial Technology Department  
A.B., San Diego State College, 1951; M.B.A., University of Southern California, 1965; Ed.D., Utah State University, 1972. Professor.

Experience: Manager Test Quality Control, Rocketdyne; plant engineer, Space and Information Systems, Division North American Aviation, Inc.; chief facilities engineer, chief industrial engineer, plant engineer, Autonetics; electrical engineer, Convair, San Diego; C. F. Braun and Company, Alhambra; sales engineer, California Electric Works, San Diego. Registered professional engineer, California.

TARTAGLIA, RICHARD A. (1959) ..... Chief of Plant Operations (Acting)  
B.S., California Polytechnic State University, 1957.

Experience: Supervisor of building trades, chief of plant operations, California Polytechnic State University.

TAYLOR, QUINTARD, JR. (1977) ..... History  
B.A., Saint Augustine's College, 1965; M.A., University of Minnesota, 1971; Ph.D., 1977. Assistant Professor.

Experience: Instructor, Gustavus Adolphus College, University of Minnesota; assistant professor, Washington State University.

TASKEY, RONALD D. (1977) ..... Soil Science  
B.S., University of Montana, 1970; M.S., 1972; Ph.D., Oregon State University, 1978. Assistant Professor.

Experience: Teaching and research assistant, University of Montana and Oregon State University; instructor, University of Montana; soil survey, U.S. Forest Service.



- TELLEW, FUAD H. (1960)** ..... Associate Dean, School of Business  
B.S., College of Commerce and Economics, Baghdad, Iraq, 1950; M.A., University of Southern California, 1954; Ph.D., 1959; Post-doctoral research, University of California, Berkeley, 1967-1968. Professor.  
Experience: Accountant, Engineering Department, Iraqi State Railways; testing supervisor, Testing Bureau, University of Southern California; teaching assistant and lecturer, University of Southern California.
- TERRY, RAYMOND D. (1974)** ..... Mathematics  
B.S., State University of New York, 1966; M.S., Michigan State University, 1968; Ph.D., 1972. Associate Professor.  
Experience: Teaching assistant, Michigan State University; instructor, Georgia Institute of Technology.
- THOMAS, GUY H., JR. (1968)** ..... Graphic Communications  
B.S., California State Polytechnic College, 1953; M.A., 1971. Professor.  
Experience: Equipment technician, California State Polytechnic College; chief machinist, Union-Tribune Publishing Company, San Diego; head machinist, Magoffin Typographers, Hollywood and Evening Outlook, Santa Monica; machinist Chicago Sun-Times; field engineer, Mergenthaler Linotype Company, Chicago and San Francisco.
- THOMAS, JOHN W. (1968)** ..... Biological Sciences  
B.A., Los Angeles State College, 1957; Ph.D., University of Southern California, Los Angeles, 1968. Professor.  
Experience: Chemist, Atkinson Laboratory; public health microbiologist, Los Angeles City Health Department; teacher, Duarte Unified School District; research associate, University of Southern California.
- THOMSON, DAVID H. (1946)** ..... Biological Sciences  
B.S., University of Arizona, 1944; M.A., Claremont Graduate School, 1948; additional graduate study, Oregon State College and University of Oregon. Professor.  
Experience: Laboratory instructor, Pomona College; ranger-naturalist, Sequoia National Park.
- THRASHER, FRANK P. (1963)** ..... Crop Science  
B.S., Montana State College, 1951; M.S., 1963. Professor.  
Experience: Recruit instructor, U.S. Navy; farmer-owner, Bozeman, Montana; research agronomist, Agricultural Research Service, U.S. Department of Agriculture, Bozeman.
- THURMOND, WILLIAM (1951)** ..... Biological Sciences  
A.B., University of California, 1948; M.A., 1950; Ph.D., 1957. Professor.  
Experience: Instructor, San Mateo Junior College; associate in zoology, University of California; instructor, summer session, University of California, 1957-59; director, National Science Foundation, Summer Science Training Program for secondary students, California State Polytechnic College; visiting professor, University of Frankfurt, Germany.
- TICE, RUSSELL L. (1965)** ..... Chemistry  
B.S., Marshall University, 1960; Ph.D., University of California, Los Angeles, 1965. Professor.  
Experience: Teaching and research assistant, University of California, Los Angeles; U.S. Navy; visiting professor, Purdue University.
- TIMONE, BARNEY R. (1969)** ..... Associate Dean, Student Affairs  
B.A., Chico State College, 1965; M.A. Idaho State University, 1969.  
Experience: Teacher, Chico Unified School District; head resident and placement interviewer, Idaho State University.
- TOWNSEND, NEAL R. (1965)** ..... Mathematics  
B.S., Wisconsin State College, 1953; M.A., San Diego State College, 1961; Ph.D., Purdue University, 1972. Professor.  
Experience: Teacher, San Bernardino City Schools, Grossmont Union High School District; assistant professor, Wisconsin State University, Stevens Point; graduate instructor, Purdue University; instructor, Hancock College.

- TRAHEY, JOHN H., CAPT. (1977)** ..... Military Science  
B.A., Golden Gate University, 1971; M.B.A., California Polytechnic State University, 1977. Quartermaster Officers Candidate School, 1967; Army Exchange Officers Course, 1968; Federal Middle Managers Course, 1968; Armor Officers Advanced Course, 1972; Maintenance Officers Course, 1972.  
Experience: Executive officer, 17th Combat Aviation Group, Vietnam; operations officer, Presidio of San Francisco; company commander, division maintenance officer, MAIT team chief, 1st Armored Division, West Germany.
- TROY, BERNARD A. (1970)** ..... Education  
B.A., University of Notre Dame, 1957; S.T.L., Universidad Catholica de Chile, 1961; M.A., University of Notre Dame, 1965; Ph.D., University of Southern California, 1974. Associate Professor.  
Experience: Chaplain/foreign student advisor, University of Notre Dame; chaplain, St. Charles Boys' Home, Milwaukee; curate, Diocese of Santiago de Veraguas, Santiago; teacher/counselor/school psychologist, Monrovia Unified School District.
- TRUEX, JOSEPH W. (1954)** ..... Acting Head, Graphic Communications Department  
B.S., California State Polytechnic College, 1952; M.S., South Dakota State University, 1966. Professor.  
Experience: Floorman, San Luis Obispo Telegram-Tribune; printer: Santa Maria Advertiser; Williams Press, Flushing, New York; H. W. Wilson Company, New York City; U.S. Navy.
- TRYON, BETTE W. (1976)** ..... Child Development  
B.S., University of Maryland, 1966; M.S., 1973; Ph.D., Syracuse University, 1976. Assistant Professor.  
Experience: Elementary school teacher, teaching assistant, research assistant, lecturer, Syracuse University; program associate and consultant, Early Childhood Education programs.
- TRYON, WALTER M. (1976)** ..... Landscape Architecture  
B.L.A., State University of New York, 1964; M.L.A., 1974. Assistant Professor.  
Experience: Assistant professor, State University of New York; landscape architect, Reimann-Buechner Partnership, New York and Sasaki, Dawson, DeMay Associates, Massachusetts and Maryland National-Capital Park & Planning Commission. Registered landscape architect, Maryland and Massachusetts,
- TSENG, JAMES H. W. (1969)** ..... Electronic and Electrical Engineering  
LL.B., National Taiwan University, 1950; LL.M., Southern Methodist University, 1957; B.S., Illinois Institute of Technology, 1964; M.S., 1966; Ph.D., Southern Methodist University, 1978. Associate Professor.  
Experience: Judge, Taitung and Taichung District Courts; secretary and section chief, Justice Department, Republic of China; teaching assistant, Illinois Institute of Technology; test engineer, Northern Indiana Public Service Corporation, Hammond; research and development engineer, Research and Development Division, Advance Ross Electronics Corporation, Illinois; assistant professor, Purdue University, Calumet Campus.
- VALPEY, ROBERT G. (1972)** ..... Dean, School of Engineering and Technology  
B.S., United States Military Academy, 1945; B.M.E., Cornell University, 1950; M.S., University of Colorado, 1958; Ph.D., University of Illinois, 1962.  
Experience: Officer, U.S. Air Force; instructor, U.S. Military Academy, West Point, U.S. Air Force Academy; chief, Turbo-machinery Section, Wright Air Development Center Equipment Laboratory; director, Launch Vehicle Section and Advanced Programs Section, Space Systems Division, U.S. Air Force; dean, School of Engineering, California State College, Fullerton. Registered professional engineer, Ohio.
- VANCE, ROBERT D. (1972)** ..... Head, Food Science Department  
B.S., Brigham Young University, 1966; M.S., Ohio State University, 1968; Ph.D., 1971. Associate Professor.  
Experience: Animal Science Department, Brigham Young; Canadian Department of Agriculture; teaching assistant, Ohio State; research associate, Ohio Agriculture Research and Development Center.

- VAN De VANTER, GORDON L. (1960-66) (1968) ..... Crop Science  
B.S., California State Polytechnic College, 1953; M.A., 1965; additional graduate study, University of California, Davis.  
Experience: Commercial vegetable grower, owner-manager, contract logging and excavation operation; aerographer, USNR.
- VAN EPS, JOHN (1974) ..... Mathematics  
B.A., University of California, Berkeley, 1965; Ph.D., 1969. Associate Professor.  
Experience: Instructor, John Hopkins University; assistant professor, California State, Hayward.
- VAN WYNGAARDEN, WILLEM L. (1965) ..... Physics  
B.S., McMaster University, 1961; M.S., University of Manitoba, 1964; Ph.D., Louisiana State University and A. & M. College, 1975. Associate Professor.  
Experience: Instructor, Methodist College.
- VARNEY, ALVIN DAVID (1969) ..... Engineering Technology  
B.S., Le Tourneau College, Longview, Texas, 1964. Associate Professor.  
Experience: Machinist, Krause Corporation, Hutchinson, Kansas, LeTourneau College, and U.S. Industries, Longview; trainee, Field Enterprises, Longview; product engineer, John Deere Company, Des Moines and Vernon, California.
- VEVERKA, GERALD J. (1977) ..... Architecture  
B. Arch., University of Illinois, 1963; M. Arch., University of California, Berkeley, 1977. Assistant Professor.  
Experience: Architectural practice, San Francisco; architect, Kaplan and McLaughlin, McCue Boone Tomsick; designer/draftsman, Fridstein and Fitch and Alden B. Dow Associates. Registered architect, California.
- VIERRA, RODGER (1978) ..... Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1962; M.S., 1978. Assistant Professor.  
Experience: Engineering, California Department of Transportation; farming, self-employed; California Polytechnic State University equipment technician.
- VINANDE, ROGER A. (1976) ..... Soil Science  
B.S., Michigan State University, 1967; M.S., 1969; Ph.D., University of Illinois, 1976. Assistant Professor.  
Experience: Research assistant, Michigan State University; research and teaching assignment, University of Illinois; computer terminal operator, University of Illinois; U.S. Air Force.
- VOELTZ, HERMAN C. (1965) ..... History  
B.A., University of Chicago, 1943; M.A., 1949; Ph.D., University of Oregon, 1960. Professor.  
Experience: Instructor and associate professor, Division of Continuing Education, University of Oregon; assistant professor, Oregon State University; associate professor, Western New Mexico University.
- VOITLE, ROBERT A. (1979) ..... Head, Poultry Industry Department  
B.S., West Virginia University, 1962; M.S., 1964; Ph.D., University of Tennessee, 1969. Professor.  
Experience: Graduate assistant (teaching and research), West Virginia University; assistant in poultry (teaching and research), University of Tennessee; assistant professor and associate professor, University of Florida.
- VORHIES, RALPH M. (1946) ..... Crop Science  
B.S., University of Missouri, 1938; M.A., 1941; Ed.D., 1964. Professor.  
Experience: Agriculture instructor, Belton and Couch High Schools, Missouri; instructor, Southeast State Teachers College, Missouri; horticulture adviser, USAID Guatemala; officer, U.S. Navy.

- VOSS, LARRY R. (1968) ..... Executive Assistant to the President  
B.A., Sacramento State College, 1956; graduate study, Sacramento State College and California State College at Los Angeles.  
Experience: Placement supervisor, Sacramento State College; assistant personnel officer, California State Department of Education; senior personnel analyst, Chancellor's Office, Trustees of the California State Colleges; assistant director, U.S. Office of Education project; "Improvement of Personnel Administration in State Education Agencies"; director of personnel relations, California Polytechnic State University.
- WADDELL, JOSEPH JAMES (1976) ..... Library  
B.A., California State College at San Bernardino, 1972; M.L.S. University of California, Los Angeles, 1975. Assistant Librarian.  
Experience: Engineering and surveying technician for various employers; clerk, Illinois State Geological Survey; research technician, Portland Cement Association; x-ray diffractionist, laboratory technician, American Cement Corporation; librarian, Severy, Inc., Santa Monica; assistant librarian, University of California, Los Angeles.
- WADLINGTON, FAYE (1973) ..... Nurse Practitioner  
R.N., Wichita St. Joseph School of Nursing, Kansas, 1947; additional study, Los Angeles City College, University of California, Los Angeles.  
Experience: Psychiatric nurse, Winter Veterans Administration Hospital, Topeka, Charity Hospital, New Orleans; scrub nurse, Physicians and Surgeons Hospital, Shreveport; senior nurse, Mt. Sinai Hospital, New York; May Company Department Stores; Longview Fibre Company; Los Angeles Industrial Nursing; Visiting Nurses Association, Los Angeles.
- WAHL, WILLIAM B. (1966-71) (1973) ..... English  
A.B., San Francisco State University, 1953; M.A., 1954; Ph.D., University of Salzburg, Austria, 1973. Associate Professor.  
Experience: Teacher, College of San Mateo, Sequoia High School.
- WAI, ANGLI (1967) ..... Child Development  
A.B., M.A., Scarritt College, Nashville, 1953. Associate Professor.  
Experience: Instructor, Berea College, Berea, Kentucky; teacher, State University of Iowa and Randolph Macon Woman's College.
- WALKER, HOWARD D. (1957) ..... Chemistry  
B.A., New York University, 1947; M.S., 1948; Ph.D., U.C.L.A., 1955. Professor.  
Experience: U.S. Public Health Service, postdoctorate fellow, American Meat Institute Foundation, University of Chicago; group leader, Veterans Hospital, Downey, Illinois; instructor, Northwestern University.
- WALKER, ISAAC N. (1967) ..... English  
B.S., Northwestern University, 1953; M.A., University of Texas, 1955; Ph.D., 1965. Professor.  
Experience: Teaching assistant, special instructor, University of Texas; instructor, Southwest Texas State College; instructor, Del Mar College, Corpus Christi; assistant professor, North Texas State University.
- WALKER, KENDRICK W. (1973) ..... Head, Philosophy Department  
B.A., University of Southern California, 1965; M.A. 1969; Ph.D., 1974. Associate Professor.  
Experience: Teaching assistant and lecturer, University of Southern California; lecturer, Mt. St. Mary's College.
- WALL, LEONARD W. (1969) ..... Physics  
B.S., Louisiana Polytechnic Institute, 1963; Ph.D., Iowa State University, 1969. Professor.  
Experience: Physical science aide, U.S. Waterways Experiment Station; laboratory assistant, Louisiana Polytechnic Institute; graduate teaching assistant and research assistant, Iowa State University; assistant professor, University of Kansas.

- WALL, MATT R. (1976) ..... Construction  
B.S., University of Wisconsin, 1962; M.B.A., 1972; Ph.D., Texas A&M, 1976. Associate Professor.  
Experience: Operative residential, light commercial builder, architectural field representative, Welton Beckett & Associates; instructor, Texas A&M; assistant professor, University of Denver.
- WALLACE, WILLIAM CARL (1970) ..... Director, Educational Opportunity Program  
and Disabled Student Services  
B.S., California Polytechnic State University, San Luis Obispo, 1967; M.A., 1973; additional graduate study, University of California, Santa Barbara.  
Experience: Senior youth counselor and classification counselor, California Youth Authority, Paso Robles School for Boys; consultant, California Student Aid Commission and Ethnic Heritage Program, New Haven, Connecticut.
- WALTER, VIRGINIA R. (1974) ..... Ornamental Horticulture  
B.S., Ohio State University, 1970; M.S., 1972. Assistant Professor.  
Experience: Greenhouse superintendent and technical assistant, Ohio State University.
- WALTERS, DIRK R. (1969) ..... Biological Sciences  
B.S., Western Illinois University, 1965; M.A., Indiana University, 1966; Ph.D., 1969. Associate Professor.  
Experience: Teaching associate, Indiana University; instructor, Orange County (New York) Community College.
- WALTERS, ROBERT W. (1970) ..... Acting Director, Activities Planning Center  
B.A., California State College, Fullerton, 1962; M.A., California Polytechnic State University, 1971.  
Experience: Activities advisor, University of Washington; director of student activities, athletics, foreign student affairs, Seattle Community College; director of student development, SCOPE Corporation, Stenner Glen.
- WANG, MARY Y. (1973) ..... Food Science  
B.S., California Polytechnic State University, 1969; M.S., University of California, Davis, 1972. Associate Professor.  
Experience: Chemist, Tri/Valley Growers; quality control supervisor, Tillie Lewis Foods; research assistant, University of California, Davis.
- WARD, EDWARD JOHN (1970) ..... City and Regional Planning  
B.S., University of Massachusetts, 1962; M.U.P., Michigan State University, 1964. Associate Professor.  
Experience: Research associate, School of Urban and Public Affairs, Carnegie-Mellon University; director, Planning & Research Division, Community Action, Pittsburgh, Inc.; principal planner, Urban Renewal Division, National Capital Planning Commission, Washington, D.C.; planner, City Planning Department, Miami; planning technician, Michigan State Highway Department.
- WARD, WESLEY S. (1954) ..... Architecture  
B. Arch., University of Southern California, 1953; graduate study, Spain. Professor.  
Experience: Officer, flight instructor, air installations, U.S. Air Force; draftsman-designer, Everett E. Parks, Architect; design responsibility, Benedict Beckler and Kochler, Architects and Engineers; architectural practice, design and research consultation, California, Madrid, Spain. Registered Architect, California.
- WARFIELD, DAVID L. (1975) ..... Crop Science  
B.S., University of California, Davis, 1966; M.S., 1968; Ph.D., Washington State University, 1973. Assistant Professor.  
Experience: Research assistant, University of California Davis; teaching assistant, research assistant, lab technician, Washington State University.

- WARTEN, RALPH M. (1968)** ..... Mathematics  
B.S., Brooklyn College, 1957; M.S., Purdue University, 1959; Ph.D., 1961. Professor.  
Experience: Research and teaching assistant, Purdue University; instructor, advisory mathematician, I.B.M. Corporation, Federal Systems Division; mathematician, I.B.M. Corporation, Scientific Center.
- WATERBURY, ARCHIE M. (1973)** ..... Biological Sciences  
A.B., San Jose State College, 1966; M.A., 1968; Ph.D., University of California, Davis, 1972. Associate Professor.  
Experience: Teaching assistant, lecturer, University of California, Davis.
- WATSON, E. EDGAR (1973)** ..... Audiovisual Production Coordinator  
B.S., Rochester Institute of Technology, 1956; graduate study, California Polytechnic State University.  
Experience: Creative art director, Bateman Associates, Inc.; art director, Singer Business Machines; creative art director, Abby Press, Oakland; creative director, Design Advertising, Inc.; instructor, ITC College, San Francisco.
- WEATHERBY, JOSEPH N., JR. (1968)** ..... Political Science  
B.A., Baylor University, 1958; B.F.T., American Institute for Foreign Trade, 1961; M.A., Baylor University, 1962; Ph.D., University of Utah, 1968; additional graduate study, Baldwin Wallace College, Ohio; Hamline University, Minnesota; American University, Cairo; Cambridge University. Professor.  
Experience: International operations, Ford Motor Company; assistant professor, Bay de Noc College.
- WEBB, JAMES L. (1969)** ..... Physical Education  
B.S., University of North Dakota, 1962; M.S., 1963; Ph.D., University of Oregon, 1969. Professor.  
Experience: Instructor-coach, Grand Forks Public Schools, North Dakota, Staples Public Schools, Minnesota; assistant baseball coach, University of North Dakota; teaching assistant, University of Oregon.
- WEBER, BARBARA P. (1966)** ..... Home Economics  
B.S., University of Nevada, 1951; M.A., California Polytechnic State University 1968; additional graduate study, University of Nevada, California Polytechnic State University, Oregon State University. Associate Professor.  
Experience: Instructor, Allan Hancock College, Evening Division.
- WEBRE, NEIL W. (1969)** ..... Computer Science and Statistics  
B.S., Louisiana State University, 1960; A.M., Harvard University, 1968; additional graduate study, Columbia University, University of Munich. Associate Professor.  
Experience: Assistant mathematician, Brookhaven National Laboratory; computer systems analyst, Columbia University; computing systems consultant, Max Planck Institute; applied mathematician, ABT Associates, Inc.
- WEBSTER, JAMES P., JR. (1964)** ..... Agricultural Engineering  
B.S., California State Polytechnic College, 1953; graduate study, California Polytechnic State University, Oregon State University. Associate Professor.  
Experience: Dehydrator engineer, L.M. Lockhart Ranch; U.S. Army; engineering aid, junior civil engineer and assistant highway engineer, California Division of Highways; field survey chief and project engineer, Garing, Taylor, and Associates, Arroyo Grande; chief of party, Cal Poly AID Project, Zambia, Africa; farm buildings engineer, Land Use Services Division, Ministry of Rural Development, Lusaka, Zambia, Africa.
- WEINSTEIN, STEPHEN T. (1969)** ..... Mathematics  
B.A., University of Southern California, 1960; M.A., 1965; Ph.D., 1972. Professor.  
Experience: Engineering planner and program analyst, North American Aviation, Space & Information Systems Division; teacher, Bell High School; instructor, East Los Angeles City College; teaching and research assistant, University of Southern California.
- WEISENBERGER, GARY L. (1975)** ..... Agricultural Engineering  
B.S., California Polytechnic State University, 1973; M.S., 1976. Assistant Professor.  
Experience: Research technician, California Polytechnic State University.

- WENZL, MICHAEL J. (1969) .....English  
B.A., University of Oregon, 1961; M.A., 1965; Ph.D., University of New Mexico, 1969; postdoctoral study, University of California, Berkeley. Professor.  
Experience: Instructor, Arizona State University, University of New Mexico.
- WESSELS, HENRY (1970) ..... Art  
B.S., Northern Illinois University, 1957; M.F.A., University of Southern California, 1970. Associate Professor.  
Experience: Instructor, high school and community colleges; owner, studio-gallery.
- WEST, HOWARD (1959) ..... Associate Executive Vice President  
B.A., Pepperdine College, 1956; M.A., California State Polytechnic College, 1971.  
Experience: Apprentice reporter, Los Angeles Examiner; journalism instructor and acting director of public relations, Pepperdine College; editor, America's Builders; publications consultant, Southland Press; assistant to president, director, International Education, associate dean, Resources and Planning.
- WEST, JOHN W. (1968) ..... Associate Dean, School of Agriculture and Natural Resources  
B.S.A., University of Tennessee, 1947; M.S., 1948; Ph.D., Purdue University, 1951. Professor.  
Experience: U.S. Army; assistant director of research, Security Mills, Knoxville; associate professor of Poultry Science, Mississippi State University; professor and head, Department of Poultry Science, Oklahoma State University.
- WESTOVER, JAMES D. (1971) ..... Chemistry  
B.S., Arizona State College, 1960; M.S., 1962; Ph.D., Brigham Young University, 1966. Associate Professor.  
Experience: Analyst, research assistant, Arizona State College; research and teaching assistant, Brigham Young University; research chemist, E. I. Dupont de Nemours & Company, Kingston, North Carolina; lecturer, California State Polytechnic College, San Luis Obispo; teacher, Paso Robles High School.
- WHALEY, GLENN V. (1963) ..... Library  
B.A., Carroll College, 1949; M.L.S., University of Wisconsin, 1953; M.A., Drake University, 1965. Associate Librarian.  
Experience: Reference librarian, Drake University; librarian, Milwaukee Public Library.
- WHALLS, MARVIN J. (1968) ..... Head, Natural Resources Management Department  
B.S., Michigan State University, 1951; M.S., University of Michigan, 1957; Ph.D., 1970. Professor.  
Experience: Fishery research biologist, Hunt Creek Trout Research Station and research fellow, Institute for Fisheries Research, Michigan Department of Conservation; district biologist for management and development, Southern California, California Department of Fish and Game.
- WHEATLEY, PATRICK O. (1970) ..... Computer Science and Statistics  
B.A., St. Mary's Seminary, 1956; M.S., The University of Chicago, 1963; Ph.D., University of Houston, 1970. Professor.  
Experience: Aerospace Engineer, NASA, MSC, Houston; teaching assistant, University of Houston; teacher, Strake Jesuit Preparatory School, Houston.
- WHEELER, ERNEST J., JR. (1969) ..... Coach, Physical Education  
B.A., University of Washington, 1961; M.S., University of Southern California, 1966.  
Experience: Teacher and assistant basketball coach, Compton Junior College; high school coach and teacher, Anaheim.
- WHEELER, ROBERT R. (1961) ..... Animal Science  
B.S., Colorado State University, 1952; M.S., 1955; Ph.D., Oregon State University, 1962. Professor.  
Experience: Irrigated farming; ranching; graduate assistant and graduate fellow in animal nutrition, Oregon State University; junior animal husbandman, Oregon Agricultural Experiment Station.

- WHITE, MARY LOU** (1961) ..... Associate Dean, School of Human Development and Education  
B.S., Oregon State University, 1946; M.S., Washington State University, 1953; D.Ed., University of Oregon, 1973. Professor.  
Experience: High school instructor, St. Helens, Oregon; physical education instructor, Clark College, Vancouver, Washington.
- WIGHT, HEWITT G.** (1952) ..... Chemistry  
B.S., University of Utah, 1943; Ph.D., University of California, 1955. Professor.  
Experience: Teaching assistant, University of Utah, St. Martin's College, and University of California; officer, U.S. Army.
- WILEY, RICHARD C.** (1946) ..... Head, Metallurgical Engineering Department  
Special engineering courses, Stanford University; industrial arts training, San Jose State College and University of California. Professor.  
Experience: Master mechanic and welder, Utah Construction Company; welding instructor, Sacramento Junior College; Palo Alto, San Francisco, and San Jose school systems; senior welding engineer, Joshua Hendy Iron Works; field engineer, Bechtel Corporation; welding metallurgy consultant, Westinghouse Corporation; X-ray Engineering International; Linde Company, New York. Registered professional engineer, California.
- WILK, EDWARD A.** (1966) ..... Library  
B.A., Western Michigan University, 1965; M.S.L., 1966. Senior Assistant Librarian.  
Experience: I.B.M. operator, Allstate Insurance Company; salesman, Arts International, Detroit.
- WILKINS, SMILEY E.** (1974) ..... Affirmative Action Coordinator  
B.S., Winston Salem State University, 1951; graduate study, University of Southern California, University of Utah, and California Polytechnic State University.  
Experience: Personnel officer and administrative officer, Ramey, AFB, Puerto Rico; missile combat crew commander and test conductor, Vandenberg AFB; project officer for high-speed test track, rocket propulsion officer, division equal opportunity officer, and range safety officer, Holloman AFB, New Mexico; bank operations supervisor, Lompoc.
- WILKS, MAURICE L.** (1966) ..... Architecture  
M.Arch., Yale University, 1952; postdoctoral scholar, University of California, Los Angeles, 1974. Professor.  
Experience: Private practice; consulting architect; coordinating architect and senior designer, Victor Gruen Associates; consulting architect, Robert Kliegman, A.I.A.; Charles O. Matcham, FAIA; senior designer, P. J. Ellerbroek, FAIA; assistant professor, University of Kansas; associate professor, University of Utah; visiting associate research psychologist, University of California, Los Angeles. Registered architect, California, Ohio, Utah.
- WILLIAMS, GRAYDON J.** (1970) ..... Music  
B.M., New England Conservatory of Music, 1957; M.M., 1959; additional study, Eastman School of Music, Peabody Conservatory of Music. Associate Professor.  
Experience: Associate professor, College of the Ozarks.
- WILLIAMS, ROBERT F.** (1971) ..... Management  
B.S.M.E., Rice Institute, 1939; graduate study, University of Cincinnati, University of California, Los Angeles. Associate Professor.  
Experience: Lecturer, University of California, Los Angeles; Los Angeles State College, Royal Technical University, Stockholm, Gothenberg Graduate School of Business, Sweden, Copenhagen University of Commerce; president, Parsons & Williams, Inc., Management Consultants; chief industrial engineer, Crosley Division, Avco, Cincinnati.
- WILLIAMSON, DANIEL P.** (1970) ..... Economics  
B.A., University of California, Santa Barbara, 1966; Ph.D., University of California, San Diego, 1973. Associate Professor.  
Experience: Associate in economics, teaching assistant, research assistant, University of California, San Diego.



- WILLIAMSON, DAVID G. (1968)** ..... Chemistry  
B.A., University of Colorado, 1963; Ph.D., University of California, Los Angeles, 1966; postdoctoral fellow, National Research Council of Canada. Professor.  
Experience: Research assistant, University of California; chemist, National Bureau of Standards, Boulder.
- WILLIVER, MARY D. (1979)** ..... Vocational Education Productions  
A.S., City College of San Francisco, 1975; B.S., California Polytechnic State University, 1978.  
Experience: Newspaper reporter; free-lance garden columnist; Strybing Arboretum Fellowship; landscape designer and contractor; horticultural consultant.
- WILLS, MAX THOMAS (1967)** ..... Chemistry  
B.S., University of Puget Sound, 1961; Ph.D., University of Washington, 1965. Professor.  
Experience: Chemist, Oil and Refining Co.; laboratory technician, General Mills Inc.; teacher and research assistant, University of Washington; research chemist, Shell Development Co.
- WILSON, JACK D. (1976)** ..... Head, Agricultural Engineering Department  
B.S., Michigan State University, 1956; M.S., 1958; Ph.D., 1968. Professor.  
Experience: Design and experimental engineer, The Oliver Corp., South Bend, Indiana; graduate research assistant, graduate teaching assistant and instructor, Michigan State University; dairy farming, Michigan; associate professor, University of Georgia; U.S. Army. Registered professional engineer.
- WILSON, MALCOLM W. (1968)** .... Associate Dean, Undergraduate and Graduate Studies  
B.A., Western State College, 1962; M.A., 1964; Ed.D., University of Arizona, 1973.  
Experience: Teacher, Colorado, Florida, Arizona; director of short courses for primary school headmasters, University of Botswana, Lesotho, and Swaziland; U.S. Aid/Cal Poly Project, Gaborone, Botswana, Africa.
- WILSON, WALTER D. (1969)** ..... Physics  
B.S., University of California, Berkeley, 1957; Ph.D., 1966. Professor.  
Experience: Researcher, University of California, Berkeley; member of technical staff, Aerospace Corporation, San Bernardino, and Aerojet General Nucleonics, San Ramon, California.
- WILVERT, CALVIN H. (1973)** ..... Social Sciences  
B.A., University of California, Los Angeles, 1963; M.A., University of California, Berkeley, 1967; Ph.D., 1971. Associate Professor.  
Experience: Assistant professor, University of Vermont; officer, U.S. Army.
- WINGER, DONLEY J. (1963)** ..... Electronic and Electrical Engineering  
B.S.E.E., University of North Dakota, 1960; M.S.E.E., 1963; Ph.D., Iowa State University, 1971. Professor.  
Experience: Graduate assistant and instructor, University of North Dakota; design engineer consultant, Dow-Key Co.; research associate, Iowa State University; visiting professor, NASA, Edwards, California.
- WINSLOW, CARLETON MONROE, JR. (1969)** Acting Head, Architecture Department  
B.Arch., University of Southern California, 1947; M.A., 1959; M.A., University of San Diego, 1976. Professor.  
Experience: Private practice, California and Hawaii; associate professor of architecture, University of Southern California; commissioner, San Luis Obispo Architectural Review Commission. Registered architect, California.
- WOLCOTT, VICTOR F. (1962)** ..... Business Administration  
B.S., Stanford University, 1947; M.B.A., 1949. Associate Professor.  
Experience: Security analyst, Crocker First National Bank of San Francisco; financial analyst, Fibreboard Products, Inc., and Fibreboard Paper Products Corporation; extension instructor, University of California.

- WOLF, FREDERICK E. (1971)** ..... Coordinator, Special Programs  
 B.A., Pomona College, 1962; M.A., California State College, Los Angeles, 1968; additional graduate study, California Polytechnic State University, Université de Nancy, France.  
 Experience: Technician, Garrison Theater, Claremont College; stage and lighting technician, Drama Department, California State College, Los Angeles; instructor, Drama Department; college union director, activities coordinator, California Lutheran College; interpreter, purchasing agent, U.S. Army.
- WOLF, LAWRENCE J. (1970)** ..... Director, Financial Aid  
 B.A., University of Southern California, 1957; LL.B., La Salle University, 1967; M.A., California Polytechnic State University, 1973.  
 Experience: Coordinator of student discipline, financial aid counselor, California Polytechnic State University; executive assistant, supervisor-Manufacturing Controls, Space Division, North American Rockwell Corp., Downey; district manager, Chrysler-Plymouth Division, Chrysler Motors Corp.; zone manager, Ford Division, Ford Motor Company.
- WOLF, ROBERT S. (1975)** ..... Mathematics  
 B.S., Massachusetts Institute of Technology, 1966; M.S., Stanford University, 1967; Ph.D., 1974. Assistant Professor.  
 Experience: Computer programmer, Computer Research Corp; instructor, University of California, Santa Cruz; teaching assistant, Stanford University and State University of Oregon.
- WOLFF, PAUL (1971)** ..... Architecture  
 B.Arch., University of California at Berkeley; graduate study, Academy of Art and Architecture, Munich, Germany; M.S., Environmental Psychology, University of Surrey, England, 1975. Associate Professor.  
 Experience: Principal, Paul M. Wolff, A.I.A., Architect, Palo Alto and "Play Structures," Palo Alto; partner, Arutunian, Kinney, Wolff Assoc., Landscape Architecture and Recreational Designers, Palo Alto; project architect, Nobler & Chen, A.I.A., Redwood City, Keller & Daseking, A.I.A., Palo Alto; Janssen, Daseking & Keller, A.I.A., Menlo Park; architectural designer, Hawley & Peterson, A.I.A., Palo Alto; Clark, Stromquist, Potter & Ehrlich, A.I.A., Palo Alto; draftsman and designer, Richard J. Neutra, FAIA, Los Angeles; U.S. Army; architectural designer, Jönsson & Jönsson, Stockholm. Registered architect, California.
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 A.B., University of California at Davis, 1971; M.S., California Polytechnic State University, San Luis Obispo, 1974.  
 Experience: Assistant basketball coach, University of California at Davis; elementary physical education specialist, Woodland; graduate assistant, California Polytechnic State University.
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 B.S., Carnegie-Mellon University, 1948; M.S., University of Rochester, 1971. Professor.  
 Experience: Associate professor and staff chairman, Management Division, School of Printing, Rochester Institute of Technology; customer service representative and production supervisor, Herbick and Held Printing Company; production planner, William G. Johnston Company; typographer, layout and design artist, Metropolitan Life Insurance Company; officer, U.S. Naval Reserve.
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 B.A., San Diego State University, 1965; M.A., 1968; C.C.C., Speech Pathology, American Speech and Hearing Association. Associate Professor.  
 Experience: Speech pathology graduate traineeship, Bureau of Neurological and Sensory Diseases, U.S. Department of Health; speech pathologist, Edgemore Hospital, San Diego; audiologist, private ENT practice, San Diego; speech director, Kern County Crippled Children's Society; speech pathologist, San Luis Obispo County Schools Summer Clinics; private practice, San Luis Obispo. Licensed speech pathologist, State of California.

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Experience: Teaching fellow, University of Portland; teaching assistant, University of Oregon; research and teaching assistant, University of California; research assistant, Institute for Metabolic Research; instructor, Orange Coast College; visiting lecturer, Chapman College.
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Experience: Teacher, Hwaling Commercial School, Taiwan, China; teller, Bank of China; laboratory instructor and programmer, Utah State University; teaching assistant, Colorado State University.
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B.S., California State Polytechnic College, 1968; M.A., Fresno State College, 1969; Ed.D., Utah State University, 1972. Associate Professor.  
Experience: Production supervisor, Neal Feay Co.; manager, Monrovia Blueprint Company; assistant engineer and draftsman, Nagle Pump Company; aircraft mechanic, Schneck Engine Service; apprentice welder, AMSCO Steel Company. Registered professional engineer, California.
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B.A., Southern Illinois University, 1965; M.S., 1972.  
Experience: Programmer, teaching assistant, system analyst, Southern Illinois University; research assistant, NASA; executive assistant, manager of programming, assistant director of computational services, Chicago State University.
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B.S., Naval College of Technology, Taiwan, 1953; M.S., National Chiao-Tung University, Taiwan, 1964; M.E., McMaster University, Hamilton, Canada, 1966; Ph.D., 1969. Associate Professor.  
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B.A., University of Minnesota, 1962; B.S., 1963; M.D., 1965.  
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B.S., Texas Technological College, 1962; M.S., 1967. Associate Professor.  
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Experience: President, KCOY-Radio, Santa Maria; vice president, sales manager and director of sports, KCOY-TV; KWG Radio; KJOY Radio; John R. McFadden Public Relations, KHJ-TV.
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